PUBLIC WORKS

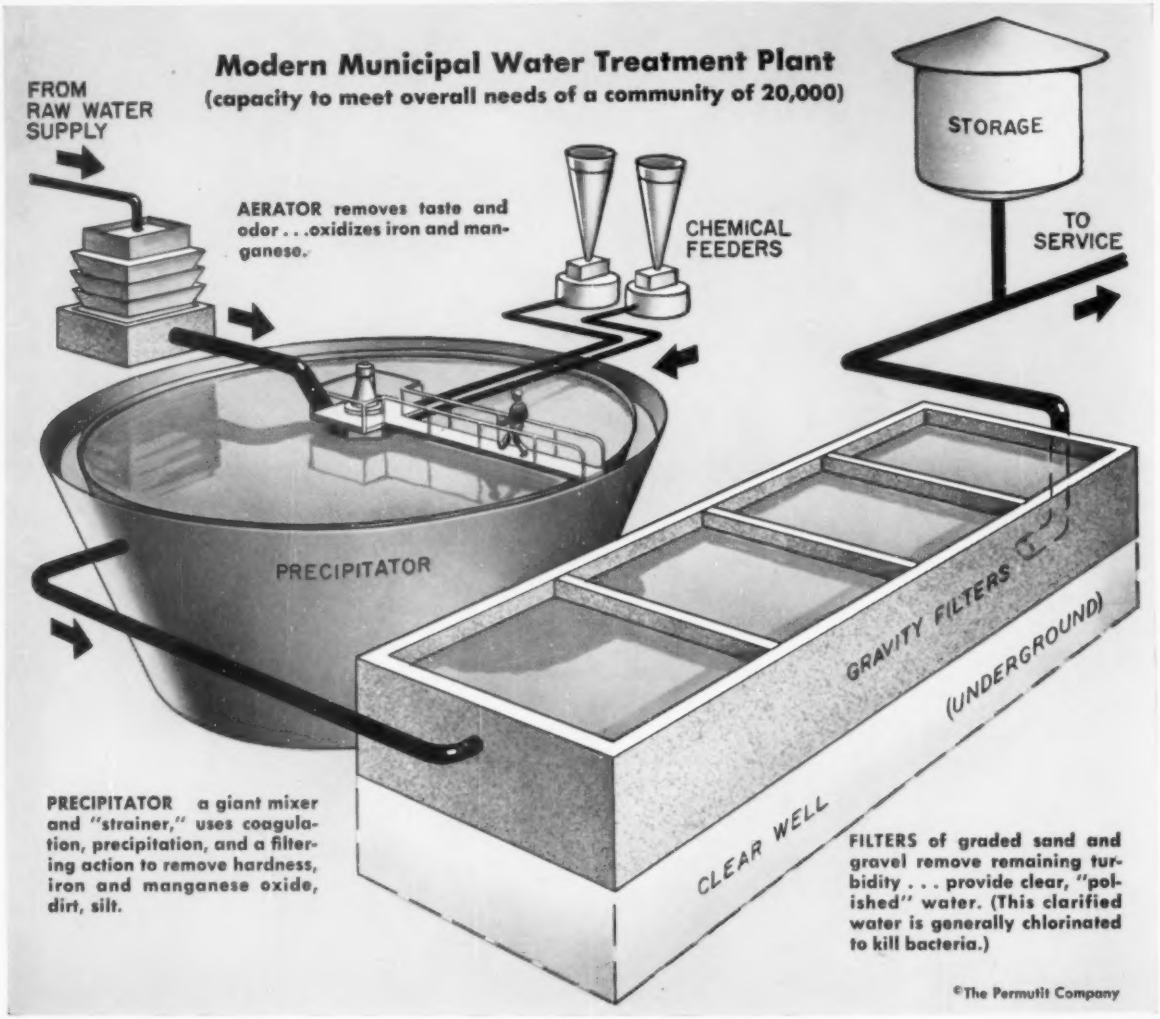
Aug. 1956

CITY, COUNTY AND STATE

d B. Lee is faced with a tough problem of sanitation as State Sanitary Engineer of da. Data on pages 18 and 112 tell how he ving the subdivision sanitation problem.

1896 1956
Our 60TH Anniversary Year

WATER: Averaging 5¢ a ton "delivered," city water is a bargain . . . but costs may go up as supplies dwindle.



City Water Needs: Up 50% by 1975

U. S. municipal water utilities distribute more "tonnage" in one day (16½ billion gal. or 68 million tons) than the nation's steel industry puts out in 6 months! **But** . . . demands by small industry, business and homes are growing sharply with a total rise of 65% since 1940. About 40% of leading U. S. cities are already in tight supply, limiting their industrial growth.

• **Farsighted planning** now will save money for all water users . . . and prevent serious shortages that could imperil health and fire protection. Here are 3 ways capacity of existing water works can be increased: 1—Use the most plentiful water supply—river, lake or well—even though it may be lower grade. Today's water conditioning equipment can bring it to top standards. 2—Convert an existing settling basin to a modern *Precipitator* . . . to increase its capacity 2 to 4 times and save on construction costs. 3—Replace natural zeolites in water softeners with a highly efficient ion exchange resin such as "*Permutit Q*" . . . to increase output up to 200%.

• **Pioneer and largest** firm in the business, The Permutit Company, designs or makes all the equipment shown above, also softeners, degasifiers, control panels, ion exchange resins, special valves, etc. As a result, Permutit supplies and stands back of the complete water treatment plant . . . no matter how large or small.

• **If your problem** is Water . . . for industrial, public or home use . . . we'd like to discuss it with you. Address: The Permutit Company, Dept. PW-8, 330 West 42nd St., New York 36, N. Y.

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rhymes with "compute it"

WATER CONDITIONING for BOILERS, PROCESSING, PUBLIC and HOME WATER SUPPLIES

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Here you can get the latest free information about new products . . . and new equipment . . . that will help you do your public works job better — easier. Thousands of engineers and technicians like you use them.

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Just run through the descriptions of the helpful catalogs, books, and service data on pages 32 to 48 and 177 to 181. Then circle the numbers you want on this card . . . sign, and mail today. No stamp necessary.

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8-56

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109 123 136 152 164 165 166 169 174 177 190 191 501 502 503 504
195 196 197 208 209 211 221 222 224 225 233 235 **New Products from pages 177 to 181:**
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399 410 419 421 422 426 431 438 448 456 461 462

Name.....

Occupation.....

Street.....

City.....State.....

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PUBLIC WORKS Publications

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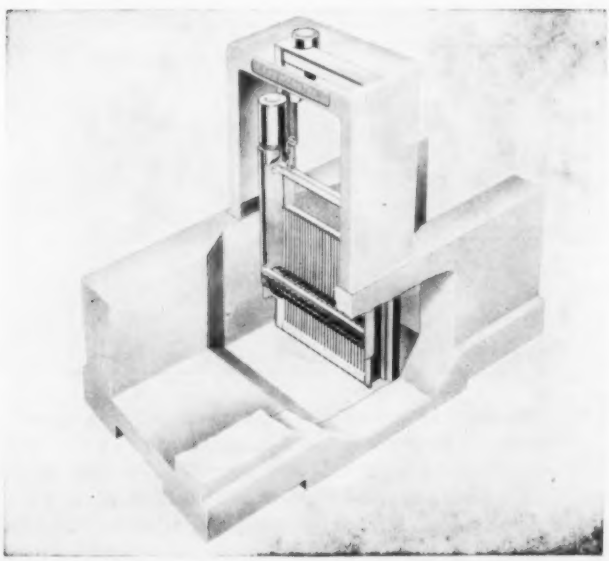
RIDGEWOOD, N. J.

Greater Flexibility in Comminution*

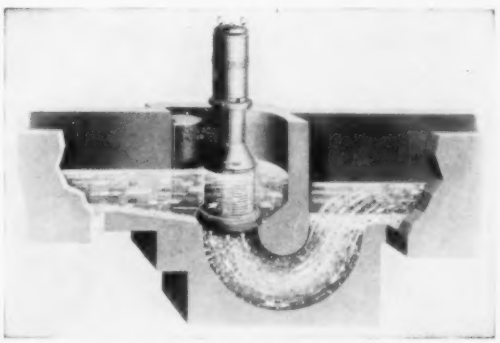
For Sewage Flows From .005 to 250 MGD Per Machine Installed In A 6" Pipe, A Basin Or A Rectangular Channel Section.

The greater flexibility and wide applicability of comminution made possible by the equipment illustrated here is the result of Chicago Pump Company's original development of comminution and the Comminutor and its 20 years of experience in over 4000 installations of exclusively successful comminution.

**Continuous screening and subsurface cutting of coarse sewage material without removal from the sewage flow, eliminating unsightly mess, nuisance and odor from screenings.*



Model "A" Barminutor Screening and Comminuting Machine. Designed for use in rectangular channel sections 4 to 12 feet wide, sized for flows of 10 MGD and upwards.



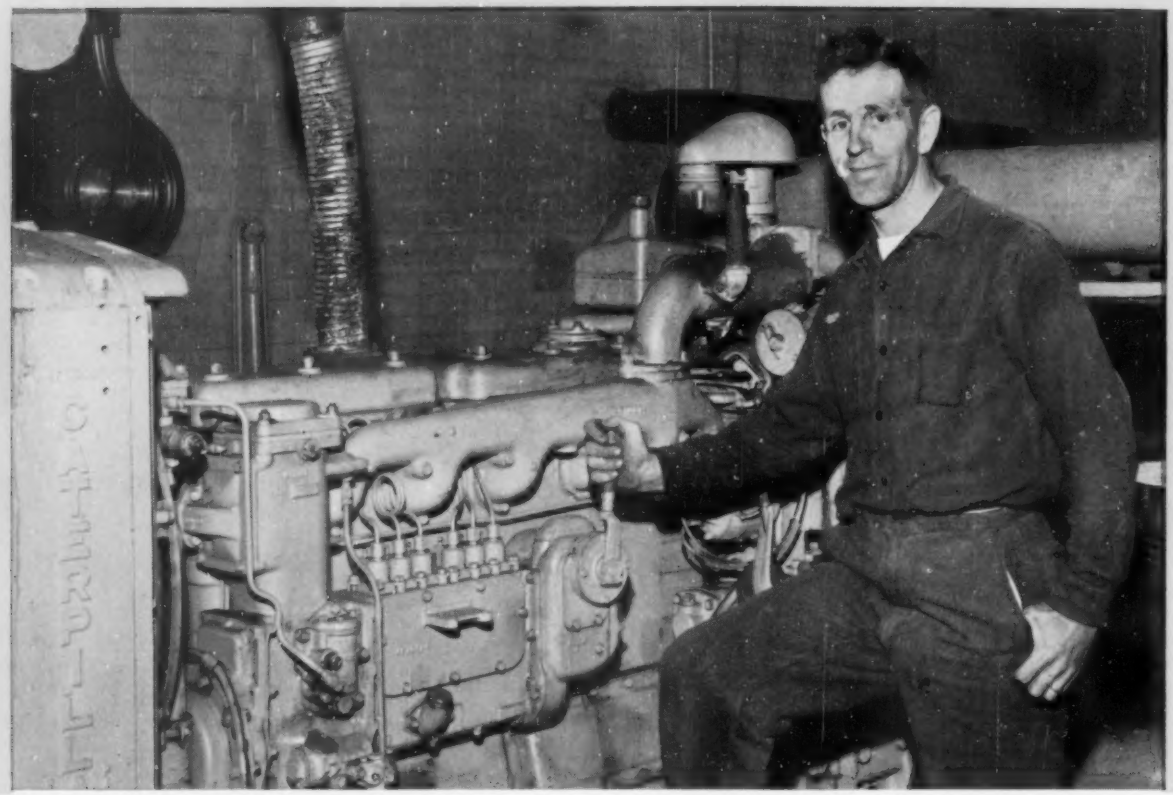
The Comminutor Screening and Comminuting Machine. Designed for use in hydraulically designed feeder basin, sized for flows from .175 to 25 MGD per machine.

◀ Model "B" Barminutor Screening and Comminuting Machine. Designed for use in rectangular channel sections 1 to 3 feet wide, sized for flows from .09 to 15 MGD.

Model 7B Comminutor Screening and Comminuting Machine. Designed for use in 6" or 8" sewer pipe, sized for flows from .005 to .175 MGD per machine.

DEPENDABILITY

—FOR THE MOST IMPORTANT HOURS IN A YEAR



That's Supt. Madison Alwardt standing beside the Caterpillar D318 Engine that's used for standby power at the water pumping station in Oak Bluffs, Mass.

In six years of service, this D318 has averaged about a hundred hours a year. For the Oak Bluffs Pumping Station, these were its most important hours. Six of them, for example, were in the heart of a hurricane that crippled regular power supplies. Another time, the D318 was in action 24 hours a day for three solid weeks. Oak Bluffs' normal population is 1500; during the summer, it is 40,000. No wonder Mr. Alwardt says, "It's nice to know we have a *dependable* source of power—just in case. . . ."

Part of this dependability comes from details like these:

CAT* standby Engines and Electric Sets start *immediately*. They are extremely simple to operate. Their Caterpillar generators require no adjustments. No skill is required. In fact, they can be equipped with automatic controls to start and operate completely unattended. They go light on fuel, too, so that your reserve supply can be smaller. And Cat Engines use non-evaporating fuel that's safe and easy to store.

Your Caterpillar Dealer will gladly explain the many other reasons these engines and electric sets are so thoroughly dependable. He has a complete line of Cat Diesels ranging up to 650 HP maximum output capacity, to protect

you and your community. And they don't need an emergency to save tax dollars for you, either. They're ideal for efficient, economical power when you're making repairs to regular power sources—or on locations where utility power is high. Remember, too, your dealer has the service and the parts you can depend on to protect your investment.

Caterpillar Tractor Co., Peoria, Illinois, U.S.A.

CATERPILLAR*

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MODERN DIESEL STANDBY POWER

Public Works T. M. Reg. U.S. Pat. Off.

Established 1896

Published Monthly by Public Works Journal Corporation. Office of Publication at Orange, Conn. Editorial and Advertising offices at 200 So. Broad St., Ridgewood, New Jersey. Subscription rates: U.S.A. and possessions, $5.00. Canada and South America, $6.00. All other countries, $7.00. Accepted as controlled circulation publication at Orange, Conn.

PUBLIC WORKS MAGAZINE

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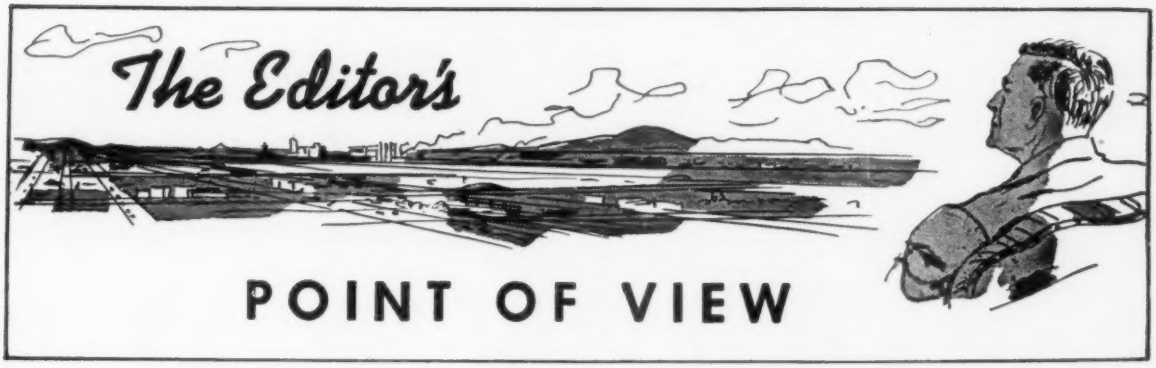
AUGUST, 1956 **Vol. 87, No. 8**

THE MOST USEFUL ENGINEERING MAGAZINE FOR CITIES, COUNTIES AND STATES



Getting Ready For Winter

THOUGH MANY engineering offices are too hot for comfort these days, it is time to prepare for what the winter will bring. Our modern needs of transportation and living will permit neither closed roads nor dangerous ones. Snow removal and ice control are vitally necessary. To accomplish this task, use must be made of the latest equipment, materials and methods.

Plenty of powerful and fast plowing equipment; salt and calcium chloride; equipment for spreading it effectively and economically; close control of operations by two-way radio; trained personnel; and an effective supervisory organization are essential. This means advance planning, so now is the time to begin ordering necessary materials and equipment, contracting with truckers for additional motive equipment and doing the innumerable other things involved in getting ready for winter. Maybe it is hard to think soundly on these matters during the August heat, but looking ahead now will save trouble this winter.

Private Sewage Treatment Plants and Their Operation

THE GROWTH of subdivisions and developments has brought many problems in sanitation. It has been pretty clearly demonstrated that the septic tank, so valuable for the isolated home, is not desirable for a large residential development; in too many cases, the installation of septic tanks in such areas is not only a waste of money but a continuing problem to homeowners and to local officials. Some of the larger developments have wisely engaged consulting engineers and in a number of cases sewage treatment plants have been designed which can be built in stages to meet the growth needs of the development; and often or usually the cost is markedly lower than for septic tanks.

Such plants, of course, are privately owned and this brings up the matter of private operation, which is a fearsome thing to many state health departments. Florida, where there have been several such private installations, has had no serious problems so far. Perhaps, as a matter of subdivision sanitation, this building of private plants, under appropriate regulations for future operation, would be a good thing. We suspect that a poorly operated private plant could be coerced into better operation a lot more easily than a similar municipal plant with an untrained operator and an obstreperous council.

The First Step: Another is Needed

SANITARY ENGINEERS of the Public Health Service, Army and Air Force, and an observer from the Navy joined in a training program in June at the Sanitary Engineering Center in Cincinnati. There were two 2-week courses for sanitary engineers. The job was well done, but there is another one to do.

From 1928 until the start of World War II, an active duty training and study course in military sanitation was carried on for Sanitary Corps officers at Carlisle Barracks, Pa. There is no space here to enumerate the many things that were done; but when war came, a background existed which permitted the quick development of a sanitary engineering service which was a powerful factor in protecting the health of our troops all over the world. That training and research in the application of sanitary engineering to military needs is no longer available; but it should be. We hope that the Public Health Service will take another forward step and create facilities and a program to meet the needs of the future.

Sanitation of the Air Lines

WITH THE CARE and thoroughness that has marked most of the operations of our big airlines, the matter of water supply and waste disposal for plane passengers has been well handled. Following the close of the war, vigorous steps were taken to bring under proper control the quality of water served on air liners; and the results are, for the most part gratifying. They afford a marked contrast with the water supply situation on many ships and at many ports, a problem which was greatly accentuated during the war and never satisfactorily solved. The air lines are to be congratulated on the development and enforcement of the necessary procedures to insure safe water and proper waste and refuse disposal.

Just specify

River crossing installation of 16" flexible joint cast iron pipe for sewer construction at Salina, Kansas.

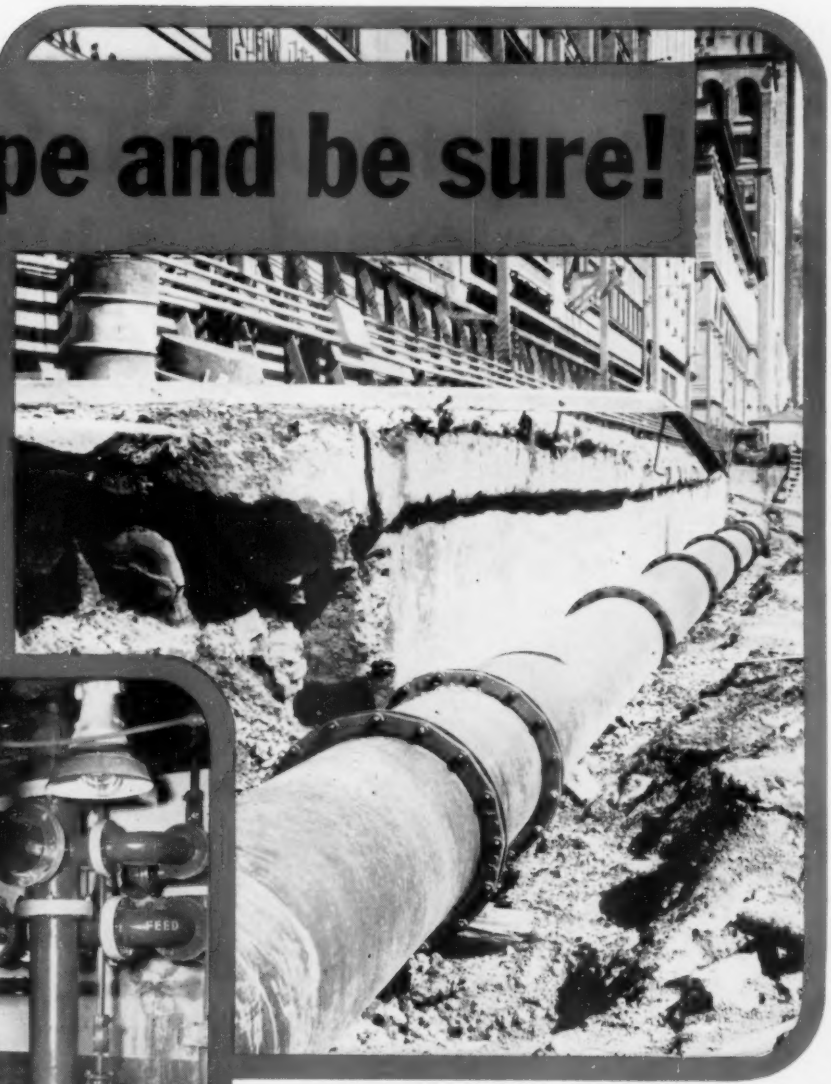
For permanent construction, it makes sense to specify pipe with a proved record of long life. Cast iron mains are in their *second century* of service in over sixty American cities. Yet these tough old mains were built with pipe made by rule-of-thumb and with rudimentary knowledge of metallurgy. Today's modernized cast iron pipe, centrifugally cast and quality controlled, is of course tougher, stronger, more durable. You can specify it with confidence. For information, write Cast Iron Pipe Research Association, Thomas F. Wolfe, Managing Director, 122 So. Michigan Ave., Chicago 3, Illinois.

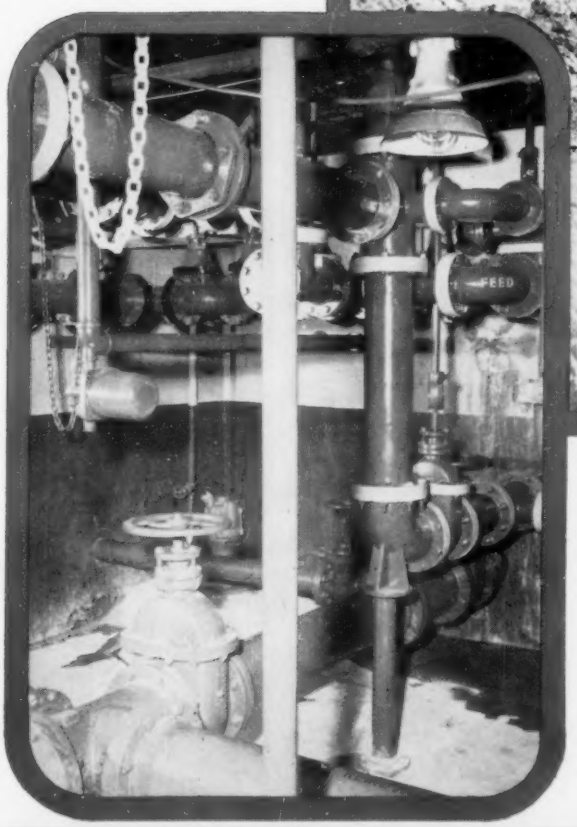
(above)
Four cast iron lines, pulled in pairs across river, being installed for large aluminum producer at Mobile, Ala. (Photo courtesy Aluminum Company of America)

(at right)
Installing cast iron pipe for gas main at Indianapolis, Ind.

CAST IRON PIPE

this pipe and be sure!

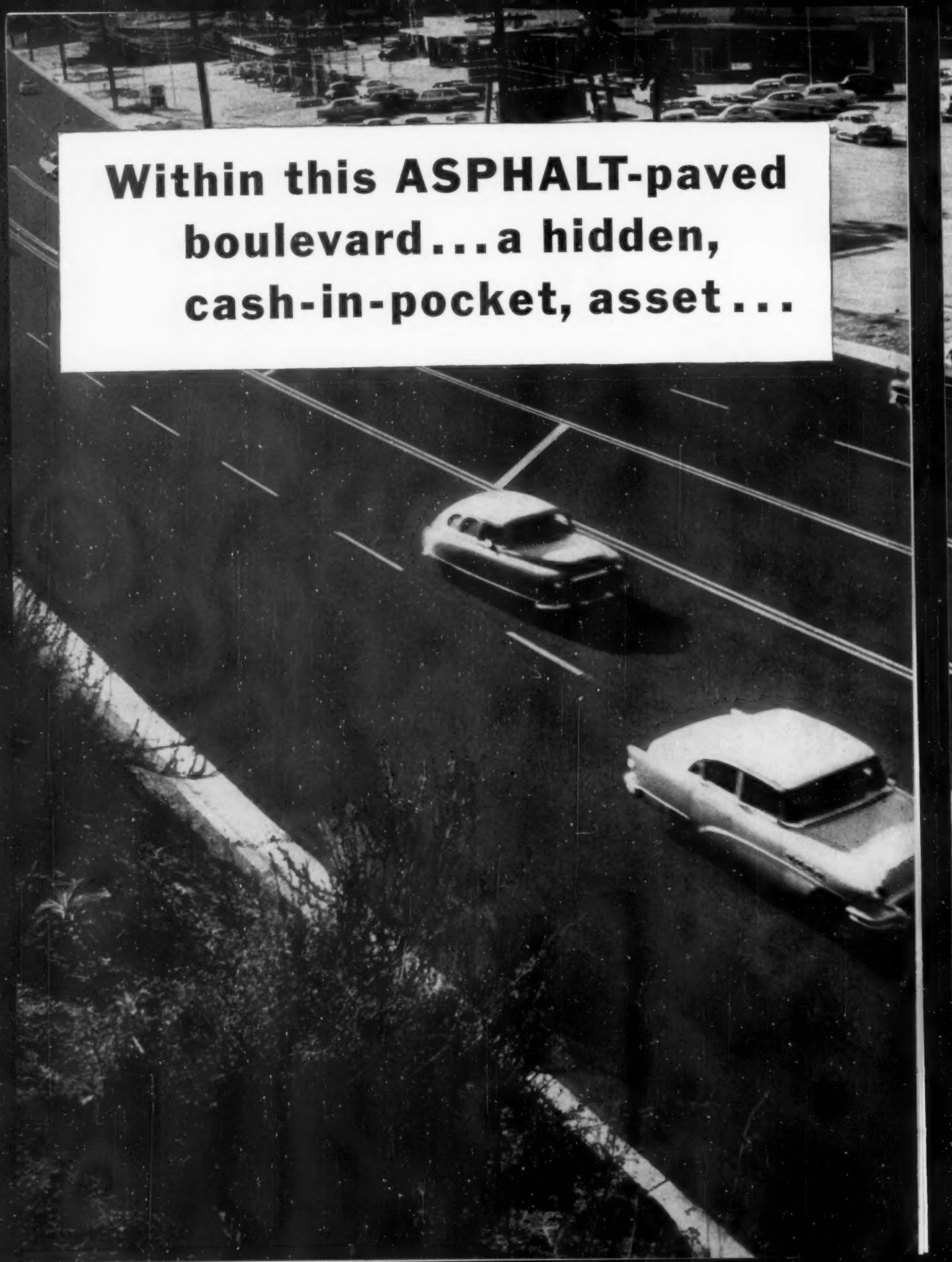




(above)
24" mechanical joint cast iron pipe installed for re-routed water line due to underground garage under Michigan Avenue, Chicago, Ill.

(at left)
Cast iron pipe installation in sewage treatment plant at Dunedin, Fla.

SERVES FOR CENTURIES...


Within this ASPHALT-paved
boulevard...a hidden,
cash-in-pocket, asset...

You can't see it!

But it's there...every dollar spent for the thirty-foot wide, 1933 street hidden beneath the Asphalt of this modern Los Angeles boulevard.

That's cash-in-pocket money . . . money that didn't have to be spent in 1955 to build the new 4-lane, separated-traffic boulevard.

Why? Because Asphalt reconstruction incorporates every part of an old pavement in the new pavement. Saves material. Saves labor.

For municipalities this presents unique opportunity. With Asphalt, engineers can make every dollar spent count towards today's street modernization programs.

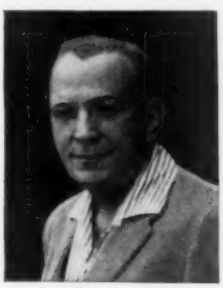
And how it counts! Not only in dollars saved. In speed of modernizing, too. Often, old pavements can be rebuilt with Asphalt within hours. Defects filled and sealed. Surfaces smoothed. Roadway widened and strengthened. Skid-resistance boosted. Drainage improved.

No need for annoying traffic tie-ups

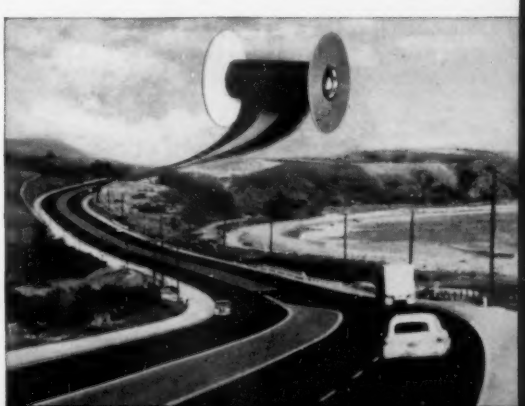
Overlaying and widening old pavement with a new Asphalt layer can be done effectively and quickly with highly efficient and portable equipment. Quality-controlled hot plant mixes plus fast modern equipment make superior work quick—easy. And the road is immediately ready for traffic.

Take advantage of the asset you have in your present paving. Use this paving as the backbone for new, smooth-riding, heavy-duty, modern Asphalt streets.

What builder says: Schroeder and Company built the Foothill Boulevard and many other roads in and around Los Angeles. Mr. H. E. Schroeder, president, has this to say about Asphalt construction: "We are called on to widen and strengthen old roads with Asphaltic concrete construction very often. It is work we like, as it is easier and less expensive than all-new construction, and we feel proud of the results. Usually, we can work in several locations during the season."



When daily traffic count rose to 16,000 on Los Angeles' Foothill Boulevard, engineers converted the original thirty-foot street to this wide modern artery. Old shoulders were removed, a good firm base constructed and a new, heavy-duty Asphalt wearing course was laid over the old pavement and the new base.



Ribbons of velvet smoothness . . .
MODERN **ASPHALT** HIGHWAYS

THE ASPHALT INSTITUTE
Asphalt Institute Building
College Park, Maryland

"Our TD-6 DROTT® 4-IN-1 can do more city jobs faster and cleaner than any other rig I've seen"

—George E. Davis,
Superintendent of
Sanitation and Streets,
Rockwood, Tennessee
(Population: 5,000)

FIRST **"First we use our Four-In-One in bulldozer, or in clamshell position** to spread or spot-place the mixed rubbish and garbage evenly. We have about 40 packed cubic yards of material to dispose of daily, six days a week."

THIRD **"Third, with Bullclam action,** under accurate *clam lip* control, we spread an even cover of six inches of dirt over each layer of refuse. Because of good compaction of the refuse, and the even spreading of cover dirt, this proves to be about right."

Now, the International Drott Four-In-One is available in three sizes

1 YARD	1½ YARD	2¼ YARD
TD-6	TD-9	TD-14

1-yard TD-6; 1½-yard TD-9; 2¼-yard TD-14. See how your city can beat the material-handling usefulness of a fleet of limited-duty machines—for a Four-In-One's moderate price. See your International Drott Distributor for a Four-In-One demonstration.

SECOND

"Second, we use compactor plate action which the operator gets instantly on the go. He can also apply hydraulic down-pressure to compress bulky refuse into minimum volume, ready to cover. It doesn't take long to really flatten materials like tin cans, cartons, etc."

FOURTH

"Our fourth step is ironing down the cover dirt, again using compactor plate action —this time with the added pressure of a ton of dirt. This makes a rat-proof, odor-proof seal; also destroys fly and mosquito hatcheries. We find, too, this step speeds decomposition of refuse."

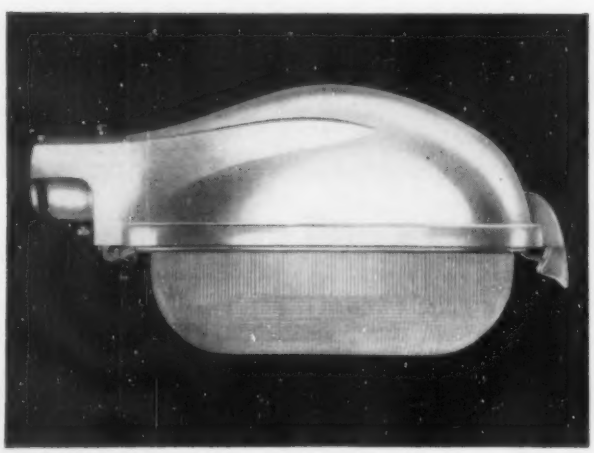
4-1

"And for a final cover," adds Mr. Davis, "we apply a two-foot layer of dirt on the completed sanitary fill. Our Four-In-One is mainly used on this work but at times we use it on street work and for back-filling sewer trenches. Besides cutting our old-method refuse disposal time in half, the outfit gives us 4-machine usefulness, to do more city jobs, faster and cleaner, than any other rig I've seen."

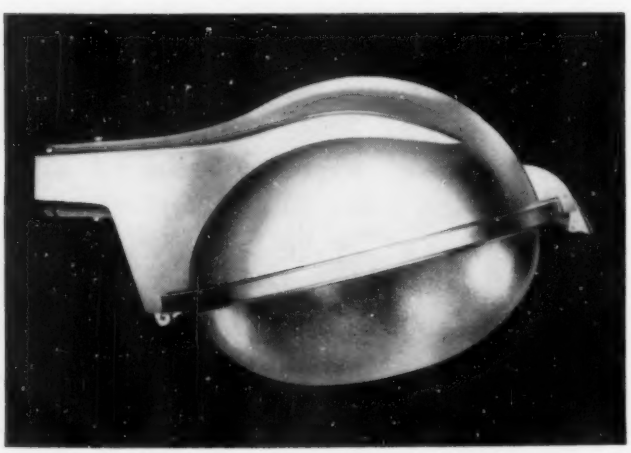
International Harvester Company, Chicago 1, Illinois
Drott Manufacturing Corp., Milwaukee 8, Wis.

INTERNATIONAL HARVESTER

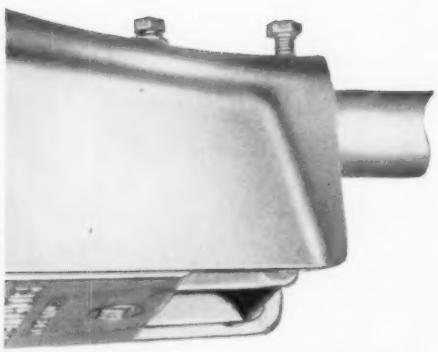
INTERNATIONAL®
DROTT



OV-20 uses 11,000-lumen CH-5, 15,000-lumen AH-1, 20,000-lumen EH-1, and 19,000-lumen JH-1 mercury lamps. Type II, III and IV distribution.



OV-60 uses 35,000-lumen AH-18, 33,000-lumen BH-18, 52,000-lumen AH-15, and 49,000-lumen BH-15 lamps. Type IV distribution.



New Westinghouse OV-35

. . . the first luminaire designed specifically for fluorescent mercury lamps

Westinghouse, pioneer in the development of mercury street lighting — the OV-20 and OV-60 — now presents the OV-35 luminaire which can be used with the 400-watt J-H1 or the 700-watt B-H18 fluorescent mercury lamps.

This third member of the Westinghouse mercury group now offers you a complete selection of mercury luminaires for any roadway application — regardless of width or traffic conditions.

The new OV-35 is the first street-lighting luminaire to include a completely sealed optical system — bugs, dirt or moisture cannot get in. Like the OV-20 and the OV-60, this new luminaire assures the best possible night visibility and a greater uniformity of pavement brightness. It inherits their same outstanding plus features, too . . . such as one-piece cast aluminum housing, new optical system, one-hand maintenance, and smooth good looks.

Whatever your roadway lighting requirements, be sure to specify Westinghouse mercury luminaires. More information? See your nearby Westinghouse representative. Or, write Westinghouse Electric Corporation, Lighting Division, Edgewater Park, Cleveland, Ohio. J-04405

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ALL USERS OF ROCK SALT FOR
ICE CONTROL, ROAD STABILIZATION=

BULLETIN. NOW YOU CAN STORE ROCK SALT OUTDOORS WITHOUT
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STERLING STORITE, PROVED EFFECTIVE IN PREVENTING
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STORITE ELIMINATES NEED FOR COSTLY STRUCTURES TO
PROTECT SALT FROM WEATHER. STORITE, MADE BY
INTERNATIONAL SALT CO., IS LOW IN COST, EASY TO APPLY.
AVAILABLE NOW. SHIPPED IN 50-LB. DRUMS WITH YOUR ORDER
OF STERLING ROCK SALT. FOR FULL DETAILS ON STERLING
STORITE WIRE OR PHONE YOUR NEAREST INTERNATIONAL
SALES OFFICE COLLECT TODAY.=

INTERNATIONAL SALT CO., INC.
SCRANTON, PENN.=

THE COMPANY WILL APPRECIATE SUGGESTIONS FROM ITS PATRONS CONCERNING ITS SERVICE

LEADER IN PUBLIC WORKS

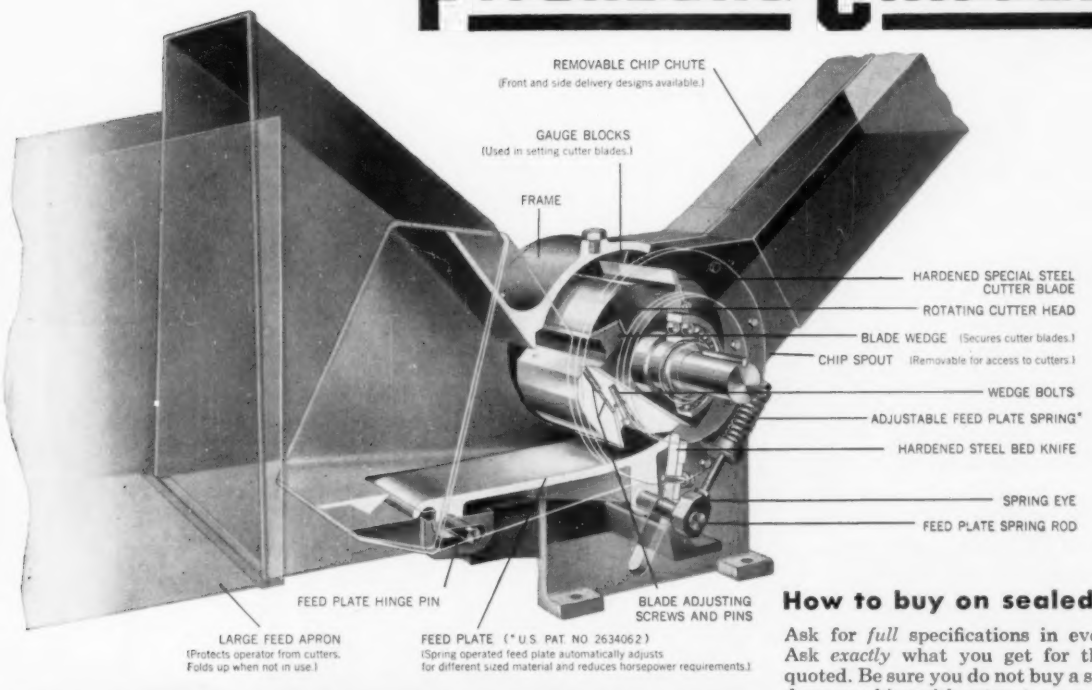
★

David B. Lee is Director of the Bureau of Sanitary Engineering of the Florida State Board of Health. In this position, which he has held since 1941 with time out for nearly four years of Army service in World War II, he has been faced with a tremendous job. Florida has been growing, both inside and outside of incorporated areas, and the problems of safe water supply and of sewage, industrial waste and refuse disposal have been most difficult. In creating policies to meet this situation, and in building up a highly capable organization, his work has been outstanding. Energy, firmness, good judgment and a fine personality have contributed to his success.

Born in Georgia, he was graduated from the University of Florida in 1932 with a BS degree; his MS was awarded by Harvard in 1937. He is a registered professional engineer. During the War he saw overseas service and was assigned to the Institute of Inter-American Affairs as a specialist in malaria control engineering. Currently he is a Sanitary Engineer Director in the Public Health Service reserve (equivalent to the rank of Colonel). He has been very active in a number of professional organizations, both state and national, including the FSIWA, AWWA, APHA, Florida Engineering Society, Florida Sewage and Industrial Waste Assn, and Florida Public Health Assn., having served as President of many of these. He has received more awards than we have room to list. He and the charming Mrs. Lee, who is well-known at conventions and meetings, have two children. We regret that space is lacking to give more information about this typically fine American family.

Here's the inside story of time-saving, labor-saving

FITCHBURG CHIPPERS



GET FULL SPECIFICATIONS—*Know what you buy*

SPECIFICATIONS: FITCHBURG CHIPPER *(unit guaranteed for workmanship and material for one year.)*

CHIPPING UNIT MODEL (Trailer Type)	TWC-6	TWC-612	TWC-9	TWC-915
Diameter of cutter head	9½″	9½″	11½″	11½″
Length of cutter head body	6″	12″	9″	15″
Number and length of cutter blades	4—6⅜″	4—12⅜″	4—9″	4—15″
Type of blade	Special High-Chrome, High-Carbon Tempered Steel			
Cutter head shaft size, (diameter)	1¾″	1¾″	2½″	2½″
Shaft keyway size	⅜″ x 3/16″	⅜″ x 3/16″	⅜″ x 5/16″	⅜″ x 5/16″
Approximate weight of chipper only	415#	650#	630#	1,000#
Maximum knife setting	1/16″	1/16″	⅛″	⅛″
Capacity—maximum size round (limbs, etc.)	4½″	4½″	7″	7″
maximum size width (slabs, etc.)	6″	12″	8½″	14½″
All units equipped with exclusive *Fitchburg Safety Spring*-activated feed plates (U.S. Patent No. 2634062)				
POWER UNIT — Gasoline fuel.				
Number of cylinders	4	6	6	6
Cu. In. Piston Displacement	162	226	226	251, 330, or 427
Water Cooled	Yes	Yes	Yes	Yes
Electric starter and generator	Yes	Yes	Yes	Yes
Clutch Power Take-Off	Disc Clutch	Disc Clutch	Disc Clutch	Disc Clutch
Battery	6-volt	6-volt	6-volt	6-volt
Governor	Var. speed	Var. speed	Var. speed	Var. speed
Oil level and pressure gauge	Yes	Yes	Yes	Yes
Water temperature gauge	Yes	Yes	Yes	Yes
Ammeter	Yes	Yes	Yes	Yes
Key ignition switch	Yes	Yes	Yes	Yes

Power Units are the enclosed type, with industrial engines of proper horsepower and torque ratings.

TRAILER UNIT. All welded steel construction. Steel I-Beam axle. Steel hubs with roller bearings. Drop forged ring-type tow bar to fit Army-type pintle hook. Safety chains. Front and rear legs, front retractable jack-type with steel caster, rear adjustable for height. Automotive drop-center type wheels, 6-ply Commercial pneumatic tires, ranging from 6.00 x 16 to 7.50 x 16 6-leaf springs of 3,500# capacity. Trailer equipped with combination tail light and number plate bracket, with tail light operated by toggle-switch on motor panel (stop light furnished when required). Tire tread widths range from 63" on TWC-6 to 72½" on TWC-915. Fenders and tool boxes are standard equipment. **EQUIPMENT.** Proper sheaves and high-capacity v-belts. Feed apron, chip spout, side delivery chute, 2-piece truck loading chute with chip deflector. Belt guard. Extra set of cutter blades with each unit. Tools furnished consist of necessary Allen wrenches, handle, 3 gauges, honing stone, can of grease, grease gun adapter. Operating and parts manuals. Fitchburg Chippers supplied with standard gray paint unless otherwise requested.

Specifications subject to change without notice

Some of the many uses for your Fitchburg Chipper: **STORM DAMAGE • PARKS • ROADSIDE CLEARANCE • CHRISTMAS TREE DISPOSAL • DUTCH ELM DISPOSAL • SHADE TREES TRIMMINGS • HIGHWAY CONSTRUCTION**

FITCHBURG ENGINEERING CORPORATION
FITCHBURG, MASSACHUSETTS

How to buy on sealed bids

Ask for *full* specifications in every bid. Ask *exactly* what you get for the price quoted. Be sure you do not buy a stripped-down machine with extras to come. (Every Fitchburg Chipper is a complete machine, ready to operate.)

Compare the specifications on this page. See why so many cities, towns, commissions, power companies, treemen, and contractors buy Fitchburg Chippers—the only chipper with a written ONE YEAR GUARANTEE, the only machine with the patented spring-activated feed plate. (This feature provides equally smooth chipping of *all* wood sizes to machine's rated capacity.) Another exclusive feature is the hinged feed apron which can be closed when chipper is not in operation.

Fitchburg Chippers have no heavy fly wheels with their warm up period and resulting disadvantages in start-stop operation. Consequently, there is no danger of clutch strain or frequent bearing failure. Fitchburg Chippers are also known for their relative quietness—an important feature when operating on city streets.

COUPON BRINGS FREE DATA

Get the facts—get them now. There is no obligation, mail this coupon today.

FITCHBURG ENGINEERING CORPORATION
Fitchburg, Massachusetts, Dept. PW-86

Send FREE Fitchburg Chipper Data.

(NAME) (POSITION)

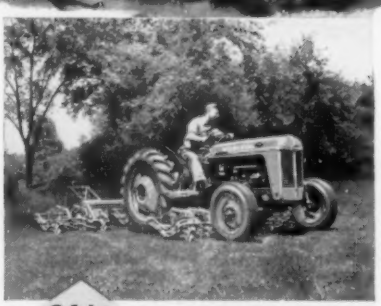
(ADDRESS)

(TOWN OR CITY) (STATE)

GREAT NEW IDEA in

52 hp **WORK BULL Model 404** with 5/8-yd. low-pivoted loader. Like all WORK BULLS, 404 has specially designed industrial front axle and heavy-duty clutch. (Diesel engine is optional.)

42 hp **WORK BULL Model 303** handles materials with either utility boom or fork lift . . . also mounts blade, loader, hoe, broom, mowers, snow plows and other attachments.



34 hp **WORK BULL Model 202** with reel-type mower to maintain grounds. WORK BULL attachments can be switched in 5 to 15 minutes — without special gear.

42 hp **Davis PIT BULL** with 24" hoe features torque converter, reversing clutches and 5 speeds forward, 5 reverse. In many cases it outworks, outperforms high-priced, single-purpose rigs.

tractors and attachments—

M-H-F WORK BULLS

NOW — from one source — a package of 5 versatile, low-cost tractors with 20 power-matched, easily-interchangeable attachments!

Contractors! Industries! Utilities! Profit from this new idea in greater machine utility and efficiency. Get the benefits of low cost attachment interchangeability . . . the high-profit performance of tools matched to power and speed . . . the adaptability of job-matched equipment to replace or supplement high-priced, single-purpose units.

What's more, you enjoy the advantages of a single sales and service source — a complete package — available only in the low-cost WORK BULL line.

New, and built to excel where other wheel tractors fail, WORK BULLS pay off in a wide variety of applications . . .

As primary equipment, WORK BULLS put former hand work on a power basis . . . efficiently handle scattered, work-and-run assignments.

As backup machines, WORK BULLS team with medium-priced, single-purpose equipment . . . give you the power equipment ratio that exactly fits the job.

As utility or cleanup tools, WORK BULLS are perfect for hustling around big layouts and relieving big equipment of unprofitable odd-job duties.

Get the complete WORK BULL story now. Write for 24-page illustrated catalog.

IMPORTANT NOTE TO RETAIL DISTRIBUTORS — WORK BULL franchises are still available in a few key areas. Write or wire for details.

FORK LIFT

Fork Lift Model 202 has lifting capacity of 1500 lbs at full height, 4000 lbs at half height. Optional mast gives lift heights to 21 ft. Works on or off hard surface.

Look at this wide choice of integrated WORK BULL attachments!

LOADERS—9 or 11 cu. ft.; ⅝-yd. or ⅞-yd.
BACKHOES—12, 16, 20, 24 or 36" buckets
MOWERS—Reel, rotary or side-mounted
FORK LIFTS — 2000 and 4000 lb. capacities
BLADES—Bull dozer, angle dozer or grader
BROOM OR SWEEPERS
POST HOLE DIGGERS
ROTARY TRENCHERS
PIPE AND CABLE LAYERS
SNOW PLOWS
UTILITY BOOMS
SCARIFIERS
HAULING HITCHES

M·H·F WORK BULLS

Division of Massey-Harris-Ferguson, Inc.

6-H Quality Avenue **Racine, Wisconsin**

PUBLIC WORKS ADMINISTRATION

A course in Public Works Administration at the San Diego State College, Department of Public Administration, was conducted during this spring, and I am enclosing a photograph taken at one of the meetings. We have had 21 enrolled, all but one taking the course for credit. The attendance, interest, and participation have been exceptionally good. A photograph was taken at the final meeting of the class.

Among the subjects that were covered were organization; personnel management; long - range planning of public works; public relations; equipment management; street improvement and maintenance; and financing of public works. Courses in Public Works Administration, I find, have been given in a number of the eastern and midwest universities but I believe this may be the first course of this kind on the Pacific Coast.

Jean L. Vincenz
Director of Public Works
County of San Diego
San Diego, California

INFECTIOUS HEPATITIS

I was pleased to see your account of the "Water-Borne Outbreak of Infectious Hepatitis" at New Delhi. (PUBLIC WORKS, June). Information such as this should be distributed as thoroughly as possible in the engineering, municipal official and public health fields. We in public health were fortunate in receiving copies of the report; however, wider distribution is necessary to point up the problem we are facing in the control of the virus diseases. Most sanitary engineers have realized for some time that chlorination, as normally practiced, has little effect on the virus and that it will readily pass through a sand filter. Since hepatitis has become general, with continuous low infection in the population, I have wondered what in our treatment processes has prevented a major outbreak.

In reading the New Delhi report, my first reaction is: Why did it happen there? Certainly we can show a number of instances in the United States where water plants have handled 50 percent or greater mixtures of sewage. Perhaps the virus concentration in our sewage is much less; however, it should be adequate to provide a good outbreak.

My feeling in this case is that the fault might lie in inadequate alum dosages. The report indicates that increases in alum dosage were necessary in an attempt to obtain coagulation.

Recent studies by the USPHS showed that alum was 100 percent effective in removing virus, providing the virus was in the water at the time of the chemical addition and sufficient alum was used to provide a good floc. It proved that the virus was removed by electro-

● PUBLIC Works Administration class. Mr. Vincenz is at extreme left, front row.

MODERN WATER STORAGE... *since 1897*

This imposing 2,000,000 gallon PDM Radial Cone Elevated Steel Tank at Muncie, Indiana typifies the progress made in municipal water storage since the *first* elevated steel tank, built by Pittsburgh-Des Moines at Scranton, Iowa nearly sixty years ago (and serving well today).
May we quote on your requirements?

Write for our latest Elevated Tank Brochure

PITTSBURGH • DES MOINES STEEL CO.

Plants at PITTSBURGH, DES MOINES, SANTA CLARA, FRESNO, and CADIZ, SPAIN

PDM ELEVATED STEEL TANKS

Sales Offices at:

PITTSBURGH (25)..3442 Neville Island
NEWARK (2) 236 Industrial Office Bldg.
CHICAGO (3) 1246 First National Bank Bldg.
LOS ANGELES (48), 6399 Wilshire Blvd.
DES MOINES (8).....943 Tuttle Street
DALLAS (1).....1247 Praetorian Bldg.
SEATTLE ..... 550 Lane Street
SANTA CLARA, CAL., 649 Alviso Road
MADRID, SPAIN....Diego DeLeon, 60

chemical processes, incorporating it into the floc nuclei rather than by the sweeping mechanical action of the floc. Perhaps we have not realized the protective value of coagulating chemicals.

Arthur E. Williamson, Director
Div. of Environmental Sanitation
State Board of Health
Cheyenne, Wyoming

METHODS FOR CONTROL OF FLIES

I read, with interest, Messrs. Smith and Keller's article "Fly Control for Cities". Our small city has about 12,000 population. I have three garbage trucks, with each having one driver, two pick-up men and one stowing on top of the load. Garbage is collected Monday and Thursday in one-half of town and Tuesday and Fridays in the other half. Wednesdays and one-half day Saturdays are trash clean-up days.

The garbage is hauled to an open dump about two miles from town. Water is so close to the surface in this low country that a sanitary fill is impossible.

My theory is that constant attack on flies by poisoning the garbage with a sugar bait will not only knock them down in town but over a period of time a considerable part of the poison will reach the dump. The dose we use is applied with a 2-gallon knapsack, pressure spray and consists of the following: two gallons of water, two pounds of sugar and two ounces of liquid "55" Malathion. All is stirred thoroughly before use.

During fly season, one man is assigned to this work and he operates as follows, using the above spray: he joins a crew for one day only and by changing from truck-to-truck, he finally works around until he has covered the town. His job is to spray the cans and tops inside and out. By spraying the inside over a period of time, it will rub off on the garbage and, therefore, get to the dump. This method insures baiting of every can surface at every back door, including schools, restaurants, etc. It seems to work very satisfactorily for us.

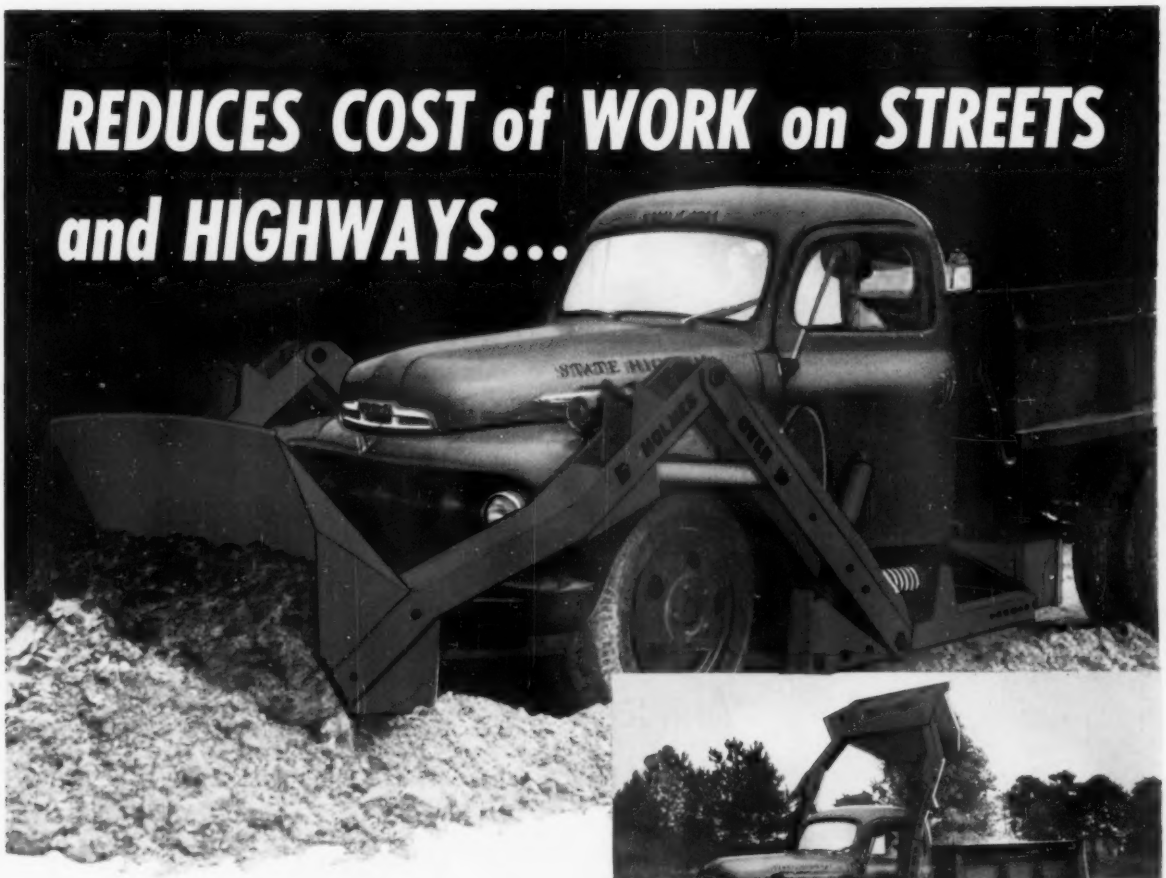
J. H. Crosby,
City Engineer,
Cambridge, Maryland

• • •

Municipal Personnel

Municipal governments were employing 1,436,000 employees in October, 1955, of which 85 percent were full-time, according to the Bureau of the Census.

REDUCES COST of WORK on STREETS and HIGHWAYS...



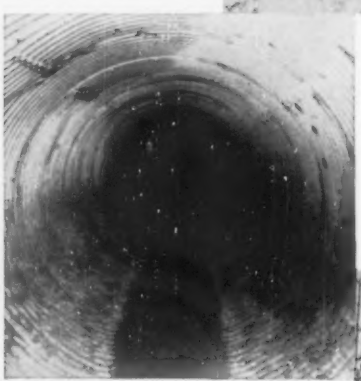
SAVES UP TO 50% on Some Jobs

Today, states, counties, and municipalities throughout the nation are successfully reducing the high cost of maintenance work on streets, roads, and highways with Holmes-Owen truck loaders. Use of the standard type loader, such as shown above, can substantially lower the cost of many jobs by simply cutting down on the number of men and equipment needed for such work. With this unit, one man handles all operations. The truck driver LOADS, HAULS, and DUMPS. He does light digging, grading, and cleaning up, without additional man power or the use of more costly equipment. A truck with such versatile one man operations has many practical uses that can easily lower job cost and actually save thousands of dollars annually for users. The standard loader is hydraulically operated, lifts ½ yard per bucket, loads the average truck in 4 minutes, and can be installed on most 1½ to 2 ton trucks using the standard dump body. See your equipment dealer or write factory for details.

New Forward-Tipping Bucket Broadens USE of LOADER

The Holmes-Owen loader is now available with a new forward tipping bucket that not only improves digging and shoveling operations, but permits the unit to be used for loading other vehicles. This feature considerably broadens the loader's use. It enables the unit to work independently–either loading, hauling or dumping; or, as a unit for loading other trucks. The new type bucket is powered by two double acting cylinders and can be easily rotated to any position up to 120 degrees. The entire loader is hydraulically operated and can be installed on most 1½ to 2 ton trucks. See your dealer or write factory for details.

ERNEST HOLMES COMPANY
Chattanooga Tennessee



This Armco Sewer has served nearly a half-century and has a life expectancy of many more years.

For long life

Armco Sewer Structures give you both structural and material durability

The 346-ton wheel load of this ladle car has traveled over this 6-foot-diameter Armco Corrugated Metal Pipe several times daily for 29 years.

Armco Corrugated Metal Structures combine both material and structural durability for balanced design. Any sewer structure needs both of these durability features. One without the other is useless. If the sewer fails structurally, your investment is lost no matter how long the material lasts.

Armco corrugated metal construction features high strength with light weight. Bolted connector bands assure strong, tight joints.

With Armco Structures you can save money by specifying the degree of material durability you need for each condition. Plain galvanized Armco Pipe and Pipe-Arch are ideal for normal service. Armco ASBESTOS-BONDED combats severe corrosive conditions. PAVED-INVERT withstands highly erosive flows. And for lasting top flow capacity, you can specify Armco SMOOTH-FLO Sewer Pipe.

ARMCO®

ARMCO
Sewer Structures

Write for data applied to your specific sewer or drainage projects. Armco Drainage & Metal Products, Inc., 4736 Curtis Street, Middletown, Ohio. Subsidiary of Armco Steel Corporation. In Canada: write Guelph, Ontario. Export: The Armco International Corporation.

ADD BANOX® TO SALT...

Stop Salt-Slush Corrosion

Snow and ice control on city streets is best maintained by low-cost* salt. But salt-slush is very corrosive, and that's where BANOX comes in.

As little as one pound of BANOX added to every 100 pounds of salt protects metal surfaces—cars, bridges and municipal equipment—against salt-slush corrosion. **And BANOX costs little, about 2¢ per capita per year, but it saves a lot.** BANOX in salt will not damage concrete, black-top or brick pavements.

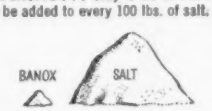
Your community deserves the low-cost protection that the salt-BANOX team can give. And remember, when spring comes, there is no costly clean-up of sewers, gutters and catch basins when you use salt.

BANOX is inexpensive to use, too; it needs no special mixing, is evenly distributed by normal traffic. Find out how the salt-BANOX team can work for you. Write for the free folder "Stop, Look and Save with BANOX."

*Comparative cost figures for both city streets and highways indicate that you can save as much as $4.27 per mile by using rock salt instead of abrasives.

EASY TO USE... BANOX needs no special mixing, is evenly distributed by traffic.

INEXPENSIVE... Only 1 lb. BANOX need be added to every 100 lbs. of salt.



Calgon, Inc.
HAGAN BUILDING, PITTSBURGH 30, PA.

PAYLOADER®

Ram twin-screw, self-powered rotary snow plow is an efficient, proven "PAYLOADER" attachment.

Ever since Hough pioneered and introduced the first unit-design tractor-shovel and called it a "PAYLOADER", the versatility and all-year usefulness of these units have sold themselves in great numbers to the officials of cities, counties, townships and states. Today, "PAYLOADER" tractor-shovels are an even better buy for public works departments because the designs have been constantly improved, because of a wide range of sizes and types, and because there are more and better attachments available, especially for the street and highway maintenance departments.

Notable features of today's "PAYLOADER" line include torque-proportioning differentials, no-stop power-shift transmissions, powerful 40-degree bucket breakout at ground level, planetary final drives and hydraulic-system load shock absorbers.

Your "PAYLOADER" Distributor is ready to show you how the superior design and versatility of "PAYLOADER" tractor-shovels make them your No. 1 Tax-savers 12 months of the year.

Top Public Service

12 MONTHS OF THE YEAR

Ram pick-up street sweeper mounts under bucket — dumps its loads into trucks.

Wain-Roy hydraulic back-hoes make a "PAYLOADER" a double ended digger.

"V" plows on the big 4-wheel drive sizes are real drift busters.

Special large-capacity snow buckets are available for faster clean-up work.

USEFUL ATTACHMENTS

- Hydraulic Back-hoes
- Pick-up Street Sweepers
- Rotary Snow Plows
- "V" Snow Plows
- Blade Snow Plows
- Backfill Blades
- Land-clearing Rakes
- Log Grapples
- Scarifier Teeth
- Snow Buckets
- Crane Hooks
- Fork Lifts
- Pusher Plates
- Winches

PAYLOADER®

MANUFACTURED BY
THE FRANK G. HOUGH CO. LIBERTYVILLE, ILL.
SUBSIDIARY—INTERNATIONAL HARVESTER COMPANY

THE FRANK G. HOUGH CO.
761 Sunnyside Ave., Libertyville, Ill.
Send information on "PAYLOADER" tractor-shovels and attachments for public works.

Name _____

Title _____

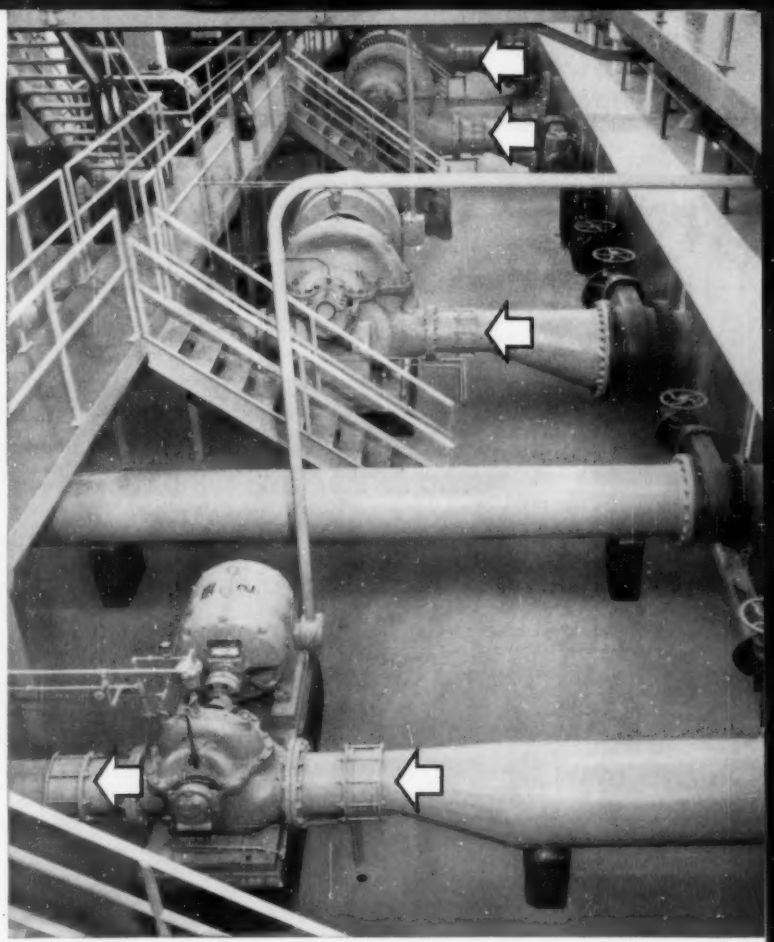
Gov't. Unit _____

Street _____

City _____ State _____

SPEAKING OF PUMP PIPING

The Elm Fork Water Plant Pumping Station of Dallas, Texas, doubles the city's purified water supply with its capacity of 105 mgd at 150 psi. Dresser Style 38 Couplings were installed on suction and discharge lines connecting high lift station pumps (right) and on discharge side of low lift pump (below) . . . to take care of movement or misalignment, and to make installation and disassembly easy. Consulting engineering was by Myers and Noyes and Associates; the contractor was E. E. Farrow Company.



DOUBLE DUTY FOR DALLAS

DRESSER COUPLINGS PROVE IDEAL FOR PUMP CONNECTIONS

Having spent eight million dollars for this superb new water facility, the city of Dallas protects its investment with Dresser-Coupled pump connections.

Thus, each line is provided with *built-in* flexibility. The resilient wedge-shaped gaskets in every Dresser Coupling absorb and cushion vibration and pipe-transmitted stresses.

Moreover, the unique Dresser design assures fast, foolproof installation. There's no need for exact pipe fitting or aligning operations. Joints are sealed bottle-tight for life . . . with a wrench, the only tool required. Any workman can make 100% tight joints and maintenance is simplified by easy teardown.

Give all your water piping jobs the same advantages. Specify Dresser Couplings—the proved, low-cost, trouble-free way to make pump connections . . . and for every other type of piping installation.

See your piping supplier today on how you can save on water and sewerage projects.

DRESSER®

ONE OF THE DRESSER INDUSTRIES

Dresser Manufacturing Division, 69 Fisher Ave., Bradford, Pa. Warehouses: 1121 Rothwell St., Houston; 101 S. Airport Blvd., S. San Francisco. Sales offices also in: New York, Philadelphia, Chicago, Denver. In Canada: Toronto and Calgary.

There's a D-O UNIT for Practically Every Step in Every Sewage Treatment Flowsheet

Vacuator installation at Kalamazoo and aerial view of the complete plant.
Consulting Engineers: Jones, Henry, & Williams, Toledo, Ohio.
Joint Contractors: C. & C. Construction Co., Inc., and Clifton Engineering Company of Michigan, Inc.

KALAMAZOO
MICHIGAN
... uses a
DORRCO VACUATOR
for Primary Treatment ... and Chemical Precipitation to meet the seasonal fluctuations of the Kalamazoo River

The 45′ dia. Dorrco Vacuator at the new sewage treatment plant at Kalamazoo is the first major unit of its type in that area. This unique plant flowsheet combines primary treatment with separate sludge digestion . . . with special provisions for chemical precipitation of the Vacuator effluent when a greater degree of treatment is desired.

Other D-O equipment at Kalamazoo includes two Dorrco Flocculator units in basins 54′ x 27′, two 85′ dia. Clarifiers, and two 70′ Dorr Multdigestion Systems.

If you would like more information on the complete line of Dorr-Oliver sewage treatment equipment write to Dorr-Oliver Incorporated, Stamford, Connecticut, for Bulletin No. 6041.

Flocculator, Vacuator, T. M. Reg. U. S. Patent Off.

DORR-OLIVER
INCORPORATED
WORLD-WIDE RESEARCH • ENGINEERING • EQUIPMENT
STAMFORD • CONNECTICUT • U.S.A.

FREE EQUIPMENT DATA to Help Your PUBLIC WORKS PROGRAM

NEW LISTINGS

The engineering information in these helpful catalogs will aid you in your Engineering and Public Works programs. Just circle numbers you want on the reply card, sign and mail. This free Readers' Service is restricted to those actively engaged in the public works field.

Concrete-Lined Reservoirs

489. A new 24-page booklet published by the Portland Cement Association, 33 W. Grand Ave., Chicago 10, Ill., points out the need for linings in reservoirs and the economy of concrete for this purpose. The booklet presents a discussion of design and construction and includes brief descriptions of shotcrete and soil-cement linings. Write to PCA or check the reply card for your copy.

The Crawler Tractor, Backbone of Construction

504. A new 12-page catalog published by American Tractor Corp., Churubusco (Ft. Wayne), Ind., graphically illustrates how and where the 30 to 60 hp TerraTrac tractors fit in the construction picture. Illustrations of the complete tractor line, plus a complete selection of matching loaders, dozers, backhoes, scarifiers and winches are included. Check the reply card.

General Electric Floodlight Bulletin

480. A new, two-color bulletin on general purpose sports and outdoor area floodlighting is now available from the General Electric Co., Schenectady, N. Y. The publication, designated GEA-6435, describes in detail the efficiency, low maintenance costs, and optimum beam candle-power distribution of the unit. Check the reply card.

Bulletin Fully Explains Golden-Anderson Valves

481. A new bulletin that fully explains the operation of Golden-Anderson valves has just been published by Golden-Anderson Valve Specialty Co., 1244 Ridge Ave., Pittsburgh 33, Pa. In clear concise language and with the aid of simple, easy-to-follow drawings the operation is thoroughly explained. Check the reply card today.

Dozers For IHC, Ford and Fordson Major Tractors

501. Rugged and economical dozer blades for the IHC 300, Ford 600 and 800, and for Fordson Major tractors are described fully in literature available from Arps Corp., New Holstein, Wis. Blades are 4, 5 and 6 ft. long and are ideal for landscaping, backfilling, leveling, snow plowing and grading. Check the reply card today.

IHC Crawler Tractors For Highway Construction

491. Information on the new International TD-6, TD-9, TD-14 and TD-18 diesel crawler tractors is contained in 8-page, 2-color booklets available from Consumer Relations Dept., International Harvester Co., 180 N. Michigan Ave., Chicago 1, Ill. Mechanical features and specifications, engine power, and operation are fully covered. Check the reply card.

Tests Invited on This Durable Crosswalk Marking

487. Crosswalk markings of Veon, the instant setting line that is easily applied, trouble-free and economical is described in literature of the Veon Chemical Corp., 22-09 Bridge Plaza, North, Long Island City 1, N. Y. Available in white, red or yellow. Tests under your local conditions are invited. Get details by checking the reply card.

Questions and Answers About Sanitary Landfills

482. This booklet will be of great value to city and county engineers thinking about sanitary landfill. Nineteen specific questions are thoroughly answered in this 20-page, two-color booklet. Covered are the various landfill methods, how to approach each, how much land is required, equipment needed and other information. Check the reply card or write Caterpillar Tractor Co., Peoria, Ill. and request Form No. DE620.

Sherman Power Digger For Digging in Any Soil

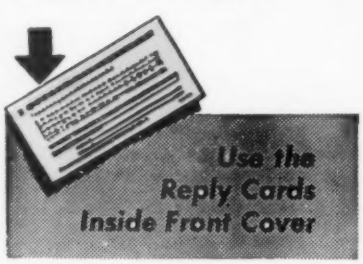
493. Sherman Major power digger literature is now available, providing details on this new hydraulic backhoe designed specifically for attachment to Ford-son-Major tractors. The unit can dig to a depth of 12½ ft. and can dig through a 180° arc of swing and to a loading height of 8 ft. 8 in. Specifications and operation are fully covered. The 8-page colored catalog can be obtained from Sherman Products, Inc., 3200 West 14 Mile Road, Royal Oak, Mich., or by checking the handy reply card.

Dorr-Oliver Equipment & Methods For Modern Sewage Treatment

494. This 12-page, two-color bulletin describes the characteristics, types, sizes, applications and operation of Dorr-Oliver sewage treatment equipment and presents a number of typical plant flowsheets. Also included are photographs and line and wash drawings of various units. Copies are available by checking the reply card or from Dorr-Oliver, Inc., Barry Place, Stamford, Conn.

Swimming Pool Sanitation Catalog

495. A new 8-page, two-color bulletin on swimming pool sanitation with Pittabs, a new slow-dissolving tablet form of calcium hypochlorite, has been issued by Columbia-Southern Chemical Corp., 632 Fort Duquesne Blvd., Pittsburgh 22, Pa. Directions on using, a table of amounts to be used according to pool gallonage and information on handling are included. Check the reply card.



Information on 5 Versatile Tractors For Municipal and County Work

484. Tractors that find scores of highly efficient applications in construction, municipalities, utilities and related fields are described fully in a catalog just released by Massey-Harris-Ferguson, Inc., Industrial Div., Quality Ave., Racine, Wisc. Models, specifications, attachments and uses are covered. For your catalog check the reply card.

Water Well Systems, Pumps and Shutter Screens

485. Water well systems, vertical turbine pumps, special water well drilling, shutter screens, water and well treatment for rehabilitating water sources and other phases of water development are covered in Bulletin No. 100. Check the reply card or write Public Relations Dept., Layne & Bowler, Inc., Memphis, Tenn., for your copy.

Information on Willys Industrial Engines and Power Units

486. A new bulletin describing fully the 1956 line of "Jeep" four-cylinder industrial engines and power units has been issued by the Industrial Engine Dept, Willys Motors, Inc., Toledo, Ohio. Suggested applications for engines and units, complete tables of engine speeds in relation to torque and horsepower ratings, special features of the engines and a listing of available accessories are included. Check the reply card.

Steam Cleaners For City, County and State Highway Departments

488. Information is now available on the Hypressure Jenny Steam cleaner from Homestead Valve Mfg. Co., P. O. Box 40, Coraopolis, Pa. This unit can be used to clean street and highway signs, trucks, garbage equipment, bar screens and thaw frozen hydrants. Check the reply card for your literature on this new steam cleaner.

Literature on Two and Four-Wheel Axle Assemblies

496. A 4-page illustrated catalog released by the United Mfg. Co., 3637 West 56th St., Cleveland 2, Ohio, describes the two and four-wheel Caravan axle assemblies. The basic two-wheel designs, construction details and uses of these assemblies are fully covered. Check the reply card today.

Complete Line of Cleveland Trenchers and Backfillers

502. A new bulletin, released by The Cleveland Trencher Co., 20100 St. Clair Ave., Cleveland 17, Ohio, features a complete line of Cleveland trenchers and backfillers along with the recently introduced ladder-type trencher. Information on capacities, specifications and dimensions is fully covered. Check the reply card for Bulletin No. L-101.

Complete Catalog on Safety Lighting Equipment and Rear View Mirrors

503. Truck mirrors, stop and tail lights, fog emergency and auxiliary lights, tractor and construction lamps and directional signals are fully covered in a complete catalog available from J. W. Speaker Corp., Milwaukee 12, Wisc. Models and specifications are included. Check the reply card.

TWO NEW POWERFUL HUBER-WARCO MOTOR GRADERS

7D 140 H. P.
28,500 lbs.
6D 100 H. P.
25,000 lbs.

Torque Converter and Power-Shift Transmission

Designed to Give the Power and Weight You Want in a Motor Grader

- Powered by GM 3-71 and GM 4-71 diesel engines.
- Tail Shaft Governor—automatically adjusts RPM to meet load conditions.
- Foot Clutch has been eliminated.
- Perfect balance of power and weight.
- Power Sliding Moldboard is standard equipment.
- Hydraulically Cab-Controlled Blade Movement—90° either side.
- Four Wheel Brakes—standard on 7D.

For a demonstration — see your nearest Huber-Warco Distributor

HUBER W WARCO

HUBER-WARCO COMPANY

MARION, OHIO, U. S. A.

Road Machinery

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NEW LISTINGS (Cont.)

Emergency Power For Your City Water Works

490. A booklet that outlines the importance of having standby power available to safeguard this vital activity and pictures Detroit Diesel installations already made throughout the country is available from Detroit Diesel Engine Div., General Motors Corp., Detroit 28, Mich. Check the reply card for information on diesel engines from 32 to 600 hp.

Literature on a Tailgate Loader

479. Information is now available on a safe, easy to operate tailgate loader. The loader is easy to install, light in weight and will lift a platform load of 600 lbs. It will fit most any standard pick-up or service utility body truck. Check the reply card or write to Midwest Body and Mfg. Div., Electrographic Corp., Paris, Illinois for your literature.

Sealing of Leaks In Water Pipe

483. The Atlas weld-patch and clamp is used for the instant sealing of leaks in pipes up to 36 inches in diameter. The weld-patch, which is made of steel and neoprene, is as strong as the pipe itself and is secured by electric arc welding without requiring purging or emptying of the pipe For full information check the reply card or write Atlas Industries, Inc., P. O. 8152, Houston, Texas.

Copper-Silicon Alloys For Sewage Treatment and Water Works Equipment

492. Everdur alloys have excellent resistance to corrosion in all types of water works installations and at all stages of sewage treatment operations. Literature on these new alloys is available from The American Brass Co., Waterbury 20, Conn., or by checking the reply card.

Paving Manual on Asphalt Hot-Mix Design

Authoritative instructions on mix design methods for hot-mix asphalt paving are furnished in a new 168-page pocket-size manual published by The Asphalt Institute. The Marshall, Hveem, Hubbard-Field and Smith Triaxial methods are outlined in detail; test procedure and interpretation of data are provided for each method; and information is given on gradation analysis of aggregates and on density and voids analysis of compacted paving mixtures. The price of this Manual is $1.00. To order, write direct to The Asphalt Institute, College Park, Md.

Blade For Tractor Makes Efficient Earth Mover

497. Literature on a rear mounted blade that fits most makes of light tractors is described in literature available from Danuser Machine Co., 533 East 3rd St., Fulton, Mo. Rugged construction makes this heavy-duty tool fine for landscaping, grading, ditching, scraping and backfilling. For full details check the reply card.

Bulletins on Chlorine Gas Control Equipment

498. Sterelators, chlorine gas control equipment, for sewage plants, water works, swimming pools and industrial applications are described in bulletins available from Everson Mfg. Co., 214 W. Huron St., Chicago 10, Ill. Semi-Automatic and manual control flow charts are illustrated as well as typical layouts. Check the reply card.

A Most Economical Scraper For Cities and Counties

499. A scraper that is capable of moving 100 to 150 cu. yds. per hour of earth is described in literature available from the Soil Mover Co., Dept. PW-8, Columbus, Nebr. It is hydraulically operated from tractor seat and has front pick-up and rear dump and is available for 25 to 50 hp wheel tractors or small crawler tractors. For prices and other information check the reply card.

Pneumatic Ejectors—Their Operation and How to Select the One You Need

500. Comprehensive data on pneumatic ejectors is furnished in a 28-page catalog issued by the Ralph B. Carter Co., 210 Atlantic Street, Hackensack, N. J. The principle of operation, construction features, operating arrangements and controls are discussed fully. Selection charts with illustrative examples help in specifying the proper ejectors, air tanks and compressors. Complete layout dimensions and sample specifications are included. To get this valuable reference, Bulletin 5408, just check the handy reply card.

●

WATER WORKS

Elevated Tanks and Other Storage Facilities

32. How engineers' designs and standard AWWA specifications are followed for fabrication and erection of water storage facilities are described in color illustrated booklet. Address the Darby Corp., Kansas City, Kans., or use the handy reply card.

Data on Cutting-In Valves, Repair Sleeves and Accessories

33. A variety of Clow products for installation and repair of cast iron pipe lines, including the Eddy cutting-in valve and sleeve, split sleeves for pipe repair, test plugs, valve boxes. Strickler pipe cutters and other fittings and accessories are featured in literature available from James B. Clow & Sons, Inc., Box 6600-A. Chicago 80, Ill. Check the reply card.

Efficient Coagulation With Ferri-Floc

69. Advantages claimed for Ferri-Floc as a coagulant include wide pH range, quick floc formation, manganese removal control of certain tastes and odors plus other aids in high quality water production. Check reply card for complete Ferri-Floc data. Tennessee Corp., Grant Bldg., Atlanta, Ga.

Model 543. No machine or method can equal the low cost loading of this Barber-Greene loader. High travel speed, high capacity and finger tip discharge control save job time, man time, truck time.

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In a Massachusetts sand and gravel pit, a Barber-Greene Model 543 Bucket Loader handles 900 tons of ¾″ stone every day—easily tops all other methods in truck loading operations.

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Engineering Information and Water Distribution Products

49. Helpful engineering information, covering water distribution problems, is available from Mueller Company in their W-96 Water Works Catalog. The 328 page catalog features a quick reference sectional indexing arrangement for easy location and identification of the hundreds of water distribution and service products illustrated. Check the reply card and you will receive detailed information on a complete line of water works equipment.

Electric Power Wherever You Need It

75. Electric power for every job—for construction, maintenance and emergencies—is always available for the owner of a convenient Homelite carryable generator. These compact gasoline engine operated units are made in a variety of sizes to suit every power requirement. Get full details by writing Homelite Div. of Textron American, Inc., Port Chester, N. Y., or check the reply card.

A Clamp That Fits Pipe Regardless of Irregularities

78. A clamp that can be used on either asbestos-cement or cast-iron pipe is described fully in a bulletin released by the Dresser Manufacturing Division, 69 Fisher Ave., Bradford, Pa. Complete instructions are given as to how the clamp is put on the pipe, along with a price list of the length and size of clamp desired. Just check the reply card.

Theory and Application Of the Flow Tube

84. Hydraulic formulae, head capacity curves and test data for this primary metering element are given in a technical bulletin, "Theory and Application of the Flow Tube," available from Foster Engineering Co., Union, N. J.

Data Offered on Elevated Steel Tanks

166. Attractive designs for elevated steel water storage tanks are shown in bulletins of R. D. Cole Mfg. Co., Newman, Georgia. For copies of latest literature check reply card.

A Short Course In Pipe Jointing

169. The story of rubber couplings for clay and concrete pipelines is graphically presented in the booklet "Pipe Enterprise", published by Hamilton Kent Mfg. Co., Kent, Ohio. Detailed description of pipe jointing methods; photos showing jobs where Tylox gaskets met the need for easily assembled, permanently tight joints installed under all conditions; and a report on the development, manufacture and outstanding features of the compression type gasket make this booklet valuable to every engineer and contractor. Check the reply card for free copy.

All-Electric Floatless Liquid Level Control

174. Description of operating principles and application of B/W controls show the simplicity and many uses of these all-electric, floatless devices. Get latest bulletins for engineering data, diagrams of typical installations and details of component parts. Check the reply card or write B/W Controller Corp., Dept. PW, Birmingham, Mich.

Engineering Data on Tilting Disc Check Valves

196. The Chapman tilting disc check valve is designed to lift away from the body seat without sliding or wearing; closes without slamming. Operating principles, details of construction, dimensions, recommendations and engineering data are fully covered in 18-page Bulletin No. 30. Get your copy by checking the reply card or write to Chapman Valve Mfg. Co., Indian Orchard, Mass.

What You Should Know About The Centriline Process

197. The Centriline method for cement mortar lining water mains 16" thru 144" in place to stop leaks, prevent corrosion, increase carrying capacity and decrease pumping costs is fully described in a handsome booklet issued by the Centriline Corp., 140 Cedar St., New York 6, N. Y. Many illustrations and typical case histories show the operation and economies of this process. The Tate process for lining smaller mains is also covered. Check reply card for your copy.

Rapid Sand and Pressure Filter Data

109. Rapid sand filters. A complete line of vertical and horizontal pressure filters, wooden gravity filters, and filter tables and other equipment. For engineering data, write Roberts Filter Manufacturing Co., 640 Columbia Ave., Darby, Pa., or check the reply card.

Does Your Water Works Have Standby Power?

224. Climax Engines are used in Municipal Water Works to supply dependable power during emergencies. They are available in a range of sizes from 40 to 600 HP and operate on either natural gas, butane, gasoline or a combination of these fuels. Use the handy reply card to obtain complete details and literature from Climax Engine & Pump Co., 208 S. La Salle St., Chicago 4, Illinois.

New Bulletin Covers Current Darling Line

235. The latest product developments as well as all equipment items produced by Darling Valve & Manufacturing Co., Williamsport, Penna. for water works services are covered in 48-page Bulletin No. 5403. Complete data on ball bearing-operated fire hydrant, including detailed design and operating features, range of types, components, accessories, dimensions and installation and maintenance data are given.

Explaining the Water Diaphragm Principle of Chlorinator Operation

243. The features, operation and benefits of the water diaphragm principle of chlorinator operation are fully described and illustrated in Publication TA-1026-C-1 of Wallace & Tiernan Inc., Belleville 9, N. J. This helpful publication is yours for merely checking the reply card.

Helpful Engineering Data on Cast Iron Pipe

422. Complete data on McWane Super-DeLavand centrifugally cast pipe with bell and spigot or mechanical joints is contained in Bulletin WP-54, issued by McWane Cast Iron Pipe Co., Birmingham 2, Ala. Size range includes 2" through 12" diameters, 18 feet long.

To order these helpful booklets check the reply card inside front cover.

Complete Catalog and Reference Data on Valves and Fittings

211. The entire M & H line of valves, fittings and accessories for water works, filtration, sewage disposal and fire protection are illustrated and fully detailed in Catalog 52 issued by M & H Valve & Fittings Co., Anniston, Ala. In addition to complete data on these products, there are many pages devoted to helpful engineering data. Every designer should have a copy. Get yours by checking the reply card.

Attractive Bulletin Features Large Elevated Tanks

252. In a 24-page booklet "Horton Elevated Steel Tanks of Large Capacity," Chicago Bridge & Iron Co., Chicago 4, Ill., describes the advantages of using large elevated steel tanks to provide gravity pressure in municipal water systems. Detailed information on radial-cone tanks of 500,000 to 3,000,000-gal. capacity and Hortonspheroidal tanks of 1,000,000 to 3,000,000 gal. is included in this really handsome bulletin. Check reply card for your copy.

Water-Conditioning Data Book Offered To Engineers

259. All engineers and municipal officials concerned with water conditioning will want a copy of the greatly enlarged edition of the popular Permutit Data Book prepared by the Permutit Co., 330 West 42nd St., New York 36, N. Y. This completely revised book presents a compilation of 78 tables, all valuable to the engineer. Subjects include hydraulics, impurities in water, reactions and conversions of chemicals used in water treatment, alkalinity relationships and other helpful material.

A Pressure Proven Joint for Concrete Pipe

335. Investigate the Amseal Joint on low pressure concrete pipe for intercepting sewers, inverted syphons, sewage force mains and low pressure water supply lines. This folder is published by American-Marietta Company, Concrete Products Division, 101 East Ontario St., Chicago 11, Illinois. Describes concrete pipe for use in sewer and water lines where maximum operating pressure will not exceed 50 psi. Check the reply card today.

Information on Prestressed Concrete Tanks

269. New 4-page technical Bulletin T-12 describes current trends in the design and construction of prestressed concrete tanks, including illustrations of typical tanks and standpipes. Check the reply card or write The Preload Co., Inc., 211 East 37th St., New York 16, N. Y.

Factors to Consider in Elevated Tank Selection

299. Details on the several different types of elevated steel tanks, including capacity ranges, tank dimensions and other factors to be considered in the selection of elevated tanks for modern water storage, plus discussions of new tanks for old towers and foundations are included in Bulletin 101 of the Pittsburgh-Des Moines Steel Co., Neville Island, Pittsburgh, Pa. Check reply card for your copy.

Helpful Data on Water Meters

330. It is to the interest of every water works superintendent and engineer to have full data on dependable Badger water meters and related meter products. Complete data on all types of disc, turbine and compound meters, meter test equipment, yokes, strainers and alarm registers are supplied in an attractive binder by Badger Meter Mfg. Co., Milwaukee 45, Wis. Check the reply card for your copy.

Important Factors in Water Meter Selection

463. Interchangeability of parts is an important advantage that is yours when you use Trident meters. The newest parts fit your oldest Tridents so you modernize when you repair. Get full data on the entire Trident water meter line by checking the reply card or write to Neptune Meter Co., 19 West 50th St., New York 20, N. Y.

Dependable Standby Power For Water Pumping

342. The use of LeRoi generator sets for dependable low-cost standby power is discussed in an attractive bulletin, No. G-6, issued by LeRoi Div. Westinghouse Air Brake Co., Milwaukee 14, Wis. Detailed specifications are included. Check the reply card for your copy.

Standard Specifications for C. I. Pipe and Fittings

278. Standard dimensions for cast iron water pipe and special castings are available in convenient booklets offered with the compliments of U. S. Pipe and Foundry Co., Birmingham 2, Ala. Get your copy by checking the reply card.

Valuable Booklet on Porous Diffuser Plates and Tubes

341. A helpful 16-page booklet published by the Norton Co. is a complete guide for the selection of porous media for installation in rapid sand filters and activated sludge plants. Full data are provided for the consulting engineer. Maintenance of porous media is also discussed at some length. Get Form 1246 from Norton Co., Worcester 6, Mass. by checking the reply card.

Water Treatment For the Small Municipality

348. This bulletin is of special interest to the engineers of small municipalities. A review of the problem of municipal water supply is discussed along with the design of a water treatment plant and the conventional treatment methods. For your copy write General Filter Co., Ames, Ia., or check the handy reply card.

Have You Heard About Bionetics For Sewage Treatment?

350. Bionetics, a dry staple powder of groups of living organisms preserved with enzyme systems, is available in several types to improve and accelerate the biological processes performed at sewage treatment plants. Get full data from Reliance Chemicals Corp., Box 6724, Houston 5, Texas. Just check the handy reply card.

How to Clean and Develop Water Wells

375. The use of Weltone, which combines the cleaning power of Calgon with disinfecting and other chemicals in a safe, highly soluble powder is described in an interesting and informative booklet. For your copy of this descriptive literature write Calgon, Inc., Hagan Bldg., Pittsburgh 30, Pa. or check the reply card.

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What You Should Know About Hypochlorination

395. "Hypochlorination of Water" is the name of an informative publication issued by Olin Mathieson Chemical Corp., Industrial Chemicals Div., Baltimore 3, Md. In it there is a discussion of chlorination theory, practice and equipment; control of algae, tastes and odors; and laboratory testing. Check the reply card for this interesting literature.

What You Should Know About the Rubber Waterstop

448. A bulletin on the Servicised rubber waterstop has been released by Servicised Products Corp., 6051 West 65th St., Chicago 38, Ill. General information, engineering service, advantages of specifying the waterstop, specifications, general and detail requirements, installation and typical applications, standard sizes and types are fully covered. Check the reply card for your copy.

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SEWERAGE AND WASTE TREATMENT

What You Should Know About Trickling Filter Underdrains

20. Specifications for vitrified clay under drain blocks conforming to ASTM standards, suggestions for layout and construction of trickling filter floors, dimensions of standard blocks, channel covers, angles and other fittings are available from the Trickling Filter Floor Institute, c/o Editor, Public Works, 200 So. Broad St., Ridgewood, N. J. Check the reply card and we will forward your request.

Do You Have An Independent Source of Electricity?

27. An independent source of electricity which will supply power for vital services when regular sources fail can be invaluable during emergencies. Check Kohler Bulletin KEP-31 which furnishes data that will help you select the plant best suited for your needs. Many models, 500 watt to 30 Kw, portable and stationary are described. Write the Kohler Co., Kohler, Wis., or use the reply card.

"Custom-Engineered" Bar Screening In Waste Treatment

38. Low cost bar screening installations and operation are pointed out in a bulletin just released by Chain Belt Co., Dept. PR, Milwaukee 1, Wisc. Details of a "Front-Cleaning" design, photos of actual installations, and mechanical features are included.

Get the Facts on The Contact Aeration Process

303. Full engineering details on the submerged contact aeration process of sewage treatment, including diagrams of plant units, area requirements, operating costs and other details are available in a bulletin of the Hays Process Co., Box 768, Waco, Texas.

Engineering Data on Gas Safety Equipment

343. P.F.T. Gas Safety Equipment for Controlled Digestion is the subject of an excellent 12-page bulletin issued by Pacific Flush Tank Co., Chicago 13, Ill. Full engineering data on flame traps, pressure releases, waste gas burners and related equipment is provided in convenient form. Requests for this valuable booklet must be made on business letterhead.

Design and Applications of the Spiragester

419. The Spiragester is a combination of a clarifier and a digester in a single unit, compactly arranged for economical construction and ease of operation. Full data on operation, explicit design information and specifications are included in Bulletin 135, issued by Lakeside Engineering Corp., 222 West Adams, Chicago, Ill. Check the reply card for a copy.

Applications of Welded Steel Pipe

456. A bulletin that describes and illustrates the advantages of welded steel pipe for piping, water supply, sewage disposal and foundation piling is available from Armco Drainage & Metal Products, Inc., Middletown, Ohio. Eleven advantages are listed and dimensional data and properties are given along with data on pressure design. Check the reply card for WSP-11055.

A Handbook of Sewer Cleaning Methods and Materials

44. Complete easy-to-follow directions for every type of sewer cleaning operations and the equipment needed for effective cleaning work is covered in a 48-page booklet issued by Flexible Inc., 3786 Durango, Los Angeles 34, Calif. Full details are provided on power cleaning machines, the SeweRodeR, hand tools and all accessories. Water main and culvert cleaning methods are included.

Valuable Bulletin on Rodney Hunt Sluice Gate

61. Sluice gate seats on a resilient rubber seal flush with the bottom of the channel and eliminates bottom wedges and the trough in which they descend. Gives design flexibility in water filtration, sewage treatment and sluices, dam, channel and chamber flow control. For complete details write to Rodney Hunt Machine Co., 82 Lake Street, Orange, Mass. for Bulletin 75, or check the reply card.

Complete Catalog for Engineers Shows Water and Sewage Plant Equipment

191. The complete line of Jeffrey equipment for treatment of water, sewage and industrial wastes is covered in 52-page Catalog 833-A. Detailed information is provided on bar screens, grinders, grit collectors, "Jigrit" washers, sludge collectors, feeders, conveyors and other related units. Photos and drawings of installations plus capacity tables complete this valuable booklet. Use reply card or write Jeffrey Mfg. Co., 947 N. 4th St., Columbus 16, Ohio.

Chemicals Used in Water, Sewage and Waste Treatment

248. A 16-page technical bulletin No. 10-K12A offered by Omega Machine Co., 345 Harris Ave., Providence, R. I., compiles in convenient form full information on the chemicals, used in water, sewage and waste treatment. Data includes formulas, common names, commerical strengths, forms in which they may be obtained, sizes of shipping containers, and many other items, including recommendations for handling and feeding. Get this useful bulletin by checking the reply card.

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Helpful Design Data For Sewage Ejectors

81. The application and advantages of pneumatic sewage ejectors are outlined in a new bulletin of the Blackburn Smith Mfg. Co., Inc., Hoboken, N. J. Included are piping diagrams for electrode and float switch controls plus dimensions and layouts for single and duplex systems. Get your copy by checking the reply card.

Comminutors for Automatic Disposal of Coarse Sewage Solids

152. The problems connected with disposal of coarse sewage solids are eliminated by clean, odorless, automatic Comminutors. Full engineering data show the proper model for every size plant and furnish details of hydraulics and typical installation. Chicago Pump Co., Dept. J., 622 Diversey Pkwy., Chicago 14, Ill. Check reply card for your copy.

How and Where to Install A Septic Tank System

270. A manual on modern sewage disposal methods for individual dwellings, camps and rural schools has just been released by Brown Co., 150 Causeway St., Boston, Mass. Location, size of and building the tank, how large a disposal field and laying out the field are discussed. Check the reply card today.

Complete Information and Installation Data on Clay Pipe

225. A fully illustrated bulletin containing complete data on vitrified clay pipe with pre-assembled Tylox flexible couplings has just been released by Universal Sewer Pipe Corporation, 1500 Union Commerce Building, Cleveland 14, Ohio. Complete information on Universal's rubber, neoprene and polyvinyl chloride resin types ow Tylox couplings is included. Check the reply card today.

Amvit Mechanical Jointed Clay Pipe

298. The new Amvit jointed vitrified clay pipe in sizes 4 through 24 inches with the true "built in" mechanical joint ready for immediate and easy installation is infiltration and root-proof. Offers better flow and less maintenance and permits deflection and absorbs shocks. It is furnished on all standard fittings and permits immediate backfilling and testing. For literature write to American Vitrified Products Co., National City Bank Building, Cleveland, Ohio, or check the reply card.

STREET LIGHTING AND TRAFFIC CONTROL

Investigate These Street Lighting Standards

54. You can get complete data on Kerrigan factory-built "Weldforged" street lighting standards, brackets and mast arms by using the handy reply card. Check these strong, well designed, inexpensive steel standards for practical street and highway lighting. Handsome 26-page folder includes data sheets on floodlighting and area lighting applications. Kerrigan Iron Works, 1033 Herman St., Nashville, Tenn.

How Electro-Matic Controllers Solve Problem of Congested Intersectio

60. Traffic control system regulated by Electro-Matic Controllers continually adjusts to changing traffic patterns to clear traffic faster and relieve the problem of congested intersections. Be sure to investigate this method of expediting traffic flow at difficult intersections. Get full data from Automatic Signal Div., Eastern Industries, Inc., East Norwalk, Conn. Just check the handy reply card.

Engineering Data on Aluminum Lighting Standards

256. Latest designs and applications of all-aluminum, seamless, tapered lighting standards, traffic signal posts and elliptical lighting brackets plus detail drawings and mechanical specifications are provided in a comprehensive 16-page bulletin issued by Pfaff & Kendall, 84 Foundry St., Newark, N. J.

Engineering Guide to Mercury Street Lighting

380. Basic engineering aspects of mercury vapor street lighting are discussed in a 35-page Engineering Guide available from Westinghouse Corp., Box 2099, Pittsburgh 30, Pa. This practical reference includes technical data on mercury lamps applicable to general lighting service, operating characteristics of the system and a discussion of methods of economic evaluation of alternative lighting systems. Check the reply card for your copy of this helpful guide.

WEED AND DUST CONTROL

Dust Control Made Easy

30. Details on an effective solution for your dust annoyance problems are presented in a colorful bulletin. "Gulf Sani-Soil-Set—the modern, proven agent for controlling dust." Get your copy to learn how this long-lasting, easily applied material can be of help. Write Gulf Oil Corp., 1822 Gulf Bldg., Pittsburgh 30, Pa. or check the reply card.

How to Cut Weed Control Costs

308. Information on a weed killer that can save hundreds of man-hours of clearing and cutting is available from Diamond Alkali Co., 300 Union Commerce Bldg., Cleveland 14, Ohio. Whether you want to control weeds or brush or both, without damage to crops or ornamentals, get this literature today by checking the reply card.

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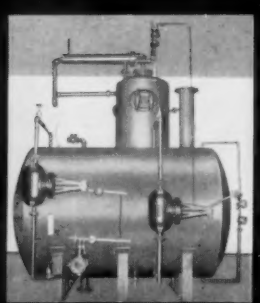

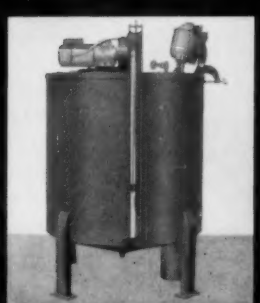

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CONSTRUCTION EQUIPMENT AND MATERIALS

Inexpensive Ditcher Handles Heavy Diggings

91. The Shawnee Scout Ditcher, a heavier model for extensive digging, has been added to the Shawnee line of ditchers and dozers. All models are designed to handle ditching and backfilling operations quickly, efficiently and at low cost. Full information on this equipment will be sent by Shawnee Mfg. Co., 1947 N. Topeka, Topeka, Kansas. Just check the reply card.

Heavy-Duty Pipe Cutter Works In or Out of Trench

164. Built to stand the most severe service, the all-purpose Ellis & Ford pipe cutter, for cast iron water mains 4" through 12", is easy to use in tight places, works in or out of trench. Full details on cutter and interchangeable parts in Catalog 39, available by checking coupon. Ellis & Ford Mfg. Co., Ferndale 20, Mich.

Restoration and Protection Of Concrete Structures

385. A "How to Do It" bulletin describing the Thoro System for repair and sealing interior and exterior masonry surfaces is available from Standard Dry Wall Products, Inc., New Eagle, Pa. The treatment for every water problem is presented in illustrated case histories in this useful publication. Check the reply card for your copy.

Advanced Tractor Design Gives Better Performance

399. The Ford Tractor offers 4-wheel stability, built-in hydraulic system, power take-off, as well as greater power, performance and economy. A complete booklet describes five tractor models in two power series, showing the latest in advanced tractor design and including many applications of equipment for saving time and money. For your copy check the reply card or write Tractor and Implement Division, Ford Motor Co., Birmingham, Mich.

Get Data on Automatic Engine Control Equipment

462. Automatic controls for engine starting and overspeed protection are described in the latest Synchro-Start literature. For full application data and specifications get Catalog No. 5 from Synchro-Start Products Inc., 8151 N. Ridgeway Ave., Skokie, Ill. Requests for this valuable literature must be made on business letterhead.

Give Full Protection To Treated Poles and Timbers

267. Bolt holes in treated poles and timbers used for guard rails and structures can easily be the first point of decay. Now you can assure maximum life by using the Greenlee Bolt Hole Treater, a simple device that forces preservative into the wood cells. Bulletin 13-15 gives the details. Write Greenlee Bros. & Co., Rockford, Ill., or check the reply card.

Booklet Helps Design of Custom-Engineered Steel Buildings

271. Custom-engineered Butler steel buildings are available in every size, type and design to meet your building needs. In a helpful 32-page booklet you will find details on several basic designs and an unlimited variety of door, window and interior treatments; answers to your questions on construction and erection; and many illustrations of typical uses. Use the reply card or write to Butler Mfg. Co., Kansas City, Mo.

Complete Line of Concrete Gunning Equipment

208. A 16-page catalog that gives complete details, specifications and operating capacities of concrete gunning equipment and answers to many of the questions asked about air placed or gunned concrete is available from Air Placement Equipment Co., 1009-11 West 24th Street, Kansas City 8, Mo. Also included are several pages of actual job application photographs showing the many and varied uses of this modern equipment. Check the handy reply card for your copy of this catalog.

A Fully Rotary Compressor by Jaeger

209. Complete information is available from The Jaeger Machine Co., Columbus 16, Ohio on this 2-stage, oil-cooled rotary compressor. Features include 80% fewer moving parts, up to 30% less weight, vibrationless operation and 100° cooler air. For full details check the reply card.

How To Build Stabilized Heavy Traffic Pavements

233. A 16-page booklet published by Seaman-Andwall Corp., Milwaukee, Wis., shows how low cost, local materials may be utilized in the construction of heavy duty pavements. Many illustrations and well-written text give full instructions on materials and construction methods for subgrades, subbases and base courses. A worth-while booklet for every highway engineer. Check reply card for copy.

"A Complete Package" of Road Building Equipment

261. A new catalog describing the road widener, trench roller and base paver has been released by Blaw-Knox Co., Construction Equipment Division, Pittsburgh 38, Pa. Illustrations, specifications and operation procedures are fully covered. Check the reply card today.

Davis Back-Hoe and Davis Loader

312. Literature is available from Mid-Western Industries, Inc., 1009 S. West St., Wichita, Kans., describing the new Davis back-hoe and Davis loader. The back-hoe can dig at right angles and to a depth of 13 ft. and detaches in 5 minutes. Both units are available for most popular makes of tractors. Check the handy reply card for more information.

STREETS AND HIGHWAYS

Bitumuls Paving Handbook Full of Useful Data

23. The latest edition of the Bitumuls Paving Handbook covers a wealth of practical data on paving methods and materials, road and airport paving specifications and construction details, complete tabular data on asphaltic binder applications and aggregate requirements, condensed Asphalt Institute specifications plus data on Laykold compounded asphalts for flooring, tennis courts, protective coatings and waterproofing. You can have a copy by checking the reply card. American Bitumuls & Asphalt Co., 200 Bush St., San Francisco 20, Calif.

1,001 Profitable Uses For Holmes-Owen Loader

39. The addition of a Holmes-Owen Loader to your dump truck converts it into a complete digging and loading unit that enables one man to load, haul and dump. Illustrated folder shows how this self-loading unit with hydraulic crowding action can be a real time and labor saver for the municipality or contractor. Check the handy reply card for full data. Ernest Holmes Co., Chattanooga, Tenn.

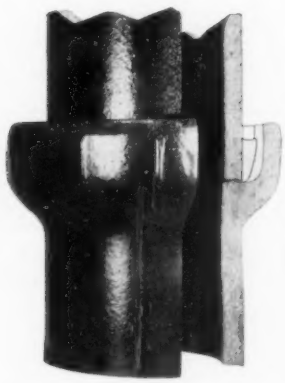
What You Should Know About 6-Wheel Trucks

53. Full information on 6-wheel trucks, both conventional and cab-over-engine models, is contained in a new 24-page catalog now available from Motor Truck Div., International Harvester Co., 180 North Michigan Ave., Chicago 1, Ill. Full color and two color treatment are employed throughout the catalog to present design and operating features of the many different lines of trucks. To get your copy of this valuable catalog check the handy reply card today.

Calcium Chloride for Roads

98. A 24-page booklet "The Why of Wyandotte Calcium Chloride for Roads" is available from Wyandotte Chemicals Corporation, Michigan Alkali Division Wyandotte, Michigan. The booklet explains in copy and pictures why calcium chloride has become so widely adopted for the treatment of unpaved road surfaces. Also, such topics as elimination of gravel loss and reduced blading are covered. Check reply card for your copy.

Reduce Pumping and Treatment Plant Costs
Prevent Infiltration with AMVIT* JOINTED CLAY PIPE



Field tests on completed AMVIT installations prove that ground water infiltration can be controlled and prevented.

Engineers can thus reduce infiltration specifications far below accepted standards, use smaller diameter pipe and lower pumping and treatment plant costs.

True Mechanical Joint

The Amvit Joint is a true mechanical joint based on the ball and socket principle. When the pipe is "pushed together", and that's all it takes to make a water-tight joint, the bell and spigot rings are in constant compression. The line is then ready for testing and backfilling.

Available in 4" through 24"

Amvit Jointed Clay pipe, in sizes 4" through 24", together with all fittings is available for immediate delivery in the Northeast and Central States.

For more information, write or call American Vitrified Products Co., National City Bank Bldg., Cleveland, Ohio, or our office nearest you.

The Amvit Joint is made of a plastic material with rubber-like characteristics. Like the pipe, the joint will withstand the most severe underground conditions. Amvit Joint is also furnished on all standard fittings.

*T. M. Registered. Patents Pending

SINCE 1900

AMERICAN

American Vitrified Products Company

CLEVELAND, OHIO

MANUFACTURERS of: Clay pipe, flue liners, clay liner plates and concrete pipe.

Plants Across the Nation... Brazil, Indiana • Chicago, Illinois • Cleveland, Ohio • Crawfordsville, Indiana • Detroit, Michigan • East Liverpool, Ohio Fenton, Michigan • Grand Ledge, Michigan • Lisbon, Ohio • Los Angeles, California • Milwaukee, Wisconsin • South Bend, Indiana • Uhrichsville, Ohio

To order these helpful booklets check the reply card inside front cover.

Finest Line of Markers for Fine Line Marking

165. Complete information on truck mounted highway markers, self-propelled line markers, all purpose line markers, and hand-propelled line markers is available from the M-B Corporation, New Holstein, Wis. Photographs and specifications of each type of line marker are included. For more, check the handy reply card.

How to Solve the Brush Disposal Problem

277. Fitchburg Chippers, engineered to solve the brush disposal problem reduce troublesome brush and trimmings to tiny, easy to-dispose-of chips. Several models are available to meet your needs. May be mounted on truck body or on trailer, tractor or jeep. Full details in interesting, profusely illustrated 16 page bulletin. Write Fitchburg Engineering Corp., Fitchburg, Mass., or check the reply card for your copy.

How the "Payloader" Helps Public Officials

190. An attractive booklet "Getting More for the Tax Dollar with Payloaders" makes worthwhile reading for every public official in charge of construction and maintenance of roads, streets, and utilities You will find illustrations and data showing dozens of ways the "Payloader" is used by cities, counties and states, plus convenient specifications on seven models. Check the reply card or write Frank G. Hough Co., 761 Seventh St., Libertyville, Ill.

Versatile Maintainer Has Year 'Round Usefulness

195. The Huber-Warco all purpose maintainer will work for you the year 'round on plowing snow, general sweeping and cleanup work, scalping berms and shoulders under guard railings, as a patch roller, berm leveler and highway mower. For full details on this piece of equipment write Huber-Warco Company, Marion, Ohio, or check the handy reply card.

Levels Sidewalks and Curbs Quickly and Easily

29. How the Mud-Jack Method for raising concrete curb, gutter, walks and streets solves problems of that kind quickly and economically without the usual cost of time-consuming reconstruction activities—a bulletin by Koehring Company, 3026 W. Concordia Ave., Milwaukee 16, Wis. Check the reply card.

Better Highways Through Salt-Soil Stabilization

123. Shoulder stabilization is the subject of a new booklet in the series of informative pamphlets issued by International Salt Co., Inc., Scranton, Pa. Step-by-step illustrations show construction procedures in detail. For practical information on this important subject check the reply card today.

Safe-T-Cones Solve Traffic Problems Night and Day

136. For data on Safe-T-Cones, the all-rubber traffic guides available in two sizes, 18" and 28"—painted or reflectorized for day and nighttime use—get bulletin from Radiator Specialty Co., Charlotte, N. C. Information included on Safe-T-Signs which add greatly to value of markers. Check the reply card.

Data On Utility Spray Tanks

221. A new 8-page catalog describes and illustrates truck mounted, 2-wheel trailer and 4-wheel trailer utility spray tanks. These tanks combine three operations in one unit, bar spraying, hand spraying and a pouring pot outlet for patching and crack filling. Two types of spray bars are available: the 10-ft. tubular type or the 8-ft. mechanically operated full circulating. Bulletin GG-5, Littleford Bros., Inc., Box 73, 452 E. Pearl St., Cincinnati 2, Ohio.

The Modern Approach to the Brush Problem

222. Eliminate your brush disposal problem by using an Asplundh Chipper. For complete information on what the Chipper can do, how it can save on costs, various types available and other outstanding features write to Asplundh Chipper Co., 505 York Road, Jenkintown, Pa., or check the reply card.

New Reflectorized Sign Faces Refurbish Old Traffic Signs

292. Get complete details on new "EZ-On" traffic sign faces ready for immediate shipments. Reflectorized faces cost only a fraction as much as new signs and are easily attached to existing traffic signs. Grace Sign & Mfg. Co., St. Louis 18, Mo.

Use of Patch Material On All Maintenance Jobs

297. With the Barber-Greene Mixall you can get hot patch material wherever and whenever you need it for all maintenance jobs. Send for new 8-page bulletin that gives full information on this small, highly portable unit that turns out all types of bituminous patch material in any quantity you need. Write Barber-Greene Co., Aurora, Ill., or use the reply card.

Information on Open Steel Mesh For Bridges

337. A 28-page catalog on open steel mesh pavement for bridges has just been released by Irving Subway Grating Co., Inc., Long Island City 1, N. Y. Design data, construction and maintenance procedures and where the decking can be used are fully covered.

Economical Scraper Handles Many Heavy Jobs

398. Among the many applications of the versatile Model D Tournapull are: grading and building roads; handling garbage disposal; and grading, leveling and terracing. For details on how its speed, power and ability to work either as a self-loading tool can help your production and lower your costs, write Le Tourneau-Westinghouse Co., Peoria, Ill., or use reply card.

The Ideal Rotary Cutter For Highway Mowing

381. Specifications and features of the B-M-B rotary cutter are fully described in literature available from B-M-B Co., Inc., 319-21 New York Ave., Holton, Kansas. Can be used for highways, airports, waterways and industrial plants.

MUELLER®

ABSOLUTE CURB CONTROL

■ Inverted key design with steep key taper is your assurance of positive water control at the curb. The Mueller Inverted Key Curb Stop has a much steeper than average key taper – a light tap on the shut-off rod unseats the key, allowing easy turning, regardless of long periods of disuse.

■ Stop bodies and keys are precision ground and individually lapped together, assuring you of a watertight fit around the ports. Added insurance against leakage is attained by using inlet water pressure to exert an upward thrust against the bottom of the inverted key, seating the key solidly in the body. As inlet pressure is increased, upward thrust against the key is increased.

■ Iron pipe, copper, lead flange and wiped joint inlets and outlets may be used in various combinations to meet your specific requirements. Stops may also be ordered in Minneapolis pattern.

Ask your Mueller Representative, or write direct for more information on the inverted key and other Mueller Curb Stops. A wide choice of solid tee head curb stops with various combinations is also available.

MUELLER CO.

Dependable Since 1857

MAIN OFFICE & FACTORY DECATUR, ILLINOIS

To order these helpful booklets check the reply card inside front cover.

Gar Wood Pipe and Utility Ditcher

421. Literature is available on the Gar Wood-Buckeye 305 crawler trencher from the Customer Service Dept., Gar Wood Industries, Inc., Wayne, Mich. Line hydraulic wheel hoist and hydraulic conveyor drive are several features of the ditcher described in the bulletins. Check the reply card.

Literature on Asphalt and Aggregate Spreaders

431. Aggregate and asphalt spreaders are fully described in literature available from Good Roads Machinery Corp., Minerva, Ohio. The "Odell" and "Handy" speakers can be hitched to any standard dump truck and can spread asphalt, gravel, clay, limestone for highway construction and maintenance. For full details check the reply card.

Self-Propelled Ditching Machines

438. Information on a self-propelled one man operated ditching machine, model 524 T, and a new midget ditcher, model 4 T, for light construction is now available from the Vermeer Mfg. Co., Pella, Iowa. The Model 524 T digs 8 to 24 inches wide and down to 6 feet deep, while the model 4 T digs 6 to 14 inches wide and down to 4½ feet deep. Full data on these ditchers available by checking the reply card.

The Trucks You Need for Every Public Works Job

461. Extra life and operating economies are built-in features of every Ford truck model. There's a chassis size and engine for each of your needs, from light utility work to heavy-duty construction jobs. Get latest literature from Ford Motor Co., Truck Div., Dearborn, Mich., by checking the reply card.

Literature Available on Wagner Tractor Equipment

464. Information on the Wagner back hoe and loader is available from Wagner Iron Works, Dept. 129, 1905 South First St., Milwaukee 1, Wisc. Specifications, types, models and other valuable data are included. For your copy check the reply card.

SNOW AND ICE CONTROL

Uniform Salt Spreading Saves Material

42. The wide, thin pattern provided by Tarco "Scotchman" spreaders avoids salt waste, saves time and labor. Get folder BL for full details on this spreader and table of material application rates. Use coupon or write Tarrant Mfg. Co., Dept. PW, Saratoga Springs, N. Y.

Reversible and Roll-Over Type Snow Plows for any Depth of Snow

389. Village, city, county, state and airport officials send for the latest information on Frink's two catalogues on reversible trip-blade and roll-over snow plows. Complete assembly details, specifications and operation are completely outlined. Write to Frink Sno-Plows, Inc., Clayton, Thousand Islands, New York, or check the reply card for the catalogues.

Catalog on Equipment For Ice and Snow Control

410. Infomation on Baker snowplows and Flink ice control spreaders is available from The Flink Co, Dept. 5613, Streator, Illinois. Fully covered are reversible and one-way plows with hydraulic power lifts to meet every specification and single or dual spinner type spreaders. For reference catalog #110 check the reply card.

Ice Control Spreading Equipment

426. The Baughman "Salt Miser" clamps to tail gate of any dump truck and gives it a complete unit for ice control. The auxiliary gas engine runs at constant idling speed and is cheaper to run continuously than to keep starting and stopping. For full details write to Baughman Manufacturing Co., Jerseyville, Illinois or check the reply card.

REFUSE COLLECTION AND DISPOSAL

Sanitary Landfill Operation and Methods

28. The location and area requirements for sanitary landfill, operation methods for trench type and area fills, equipment selection and costs are items discussed in an 8-page booklet issued by Allis-Chalmers Mfg. Co., Milwaukee 1, Wis. Be sure you have this reference when considering the problem of garbage and refuse disposal. Check the handy reply card today.

Increasing the Efficiency of Bulk Rubbish Collection

177. Strategically spotted bulk containers can be handled by one man operating a Dempster-Dumpster equipped truck. Get full details of this cost-saving system of rubbish collection, as used by many cities to increase efficiency and eliminate unsanitary conditions. Write Dempster Brothers, Inc., 952 Dempster Bldg., Knoxville 17, Tenn., or use the handy reply card.

How to Construct A Sanitary Fill

331. A new 12-page booklet which tells the most efficient method of sanitary fill construction and furnishes complete information on planning and operation is now available from Drott Mfg. Corp., Milwaukee 15, Wis., Get your copy by checking the reply card; you'll find this booklet both interesting and valuable.

What You Should Know About Refuse Incinerators

362. Two helpful bulletins tell what you should know about low cost refuse incineration for the small community and for larger cities. Your questions on mechanical stoking, burning rates and operating problems are discussed. Get Bulletins 217 and 223 from Nichols Engineering & Research Corp., 70 Pine St., New York 5, N. Y. Just check the reply card.

UNMATCHED for materials spreading

S-A SEAMAN-ANDWALL CENTURY SPREADERS

"Posi-Feed" MODEL HY-4

Posi-Feed Model HY-4 serves *all* year! The spinner used for spreading chlorides or sand in winter is easily replaced by special tray which fits the HY-4 for summer use in sealcoating — all hydraulically operated by ONLY ONE MAN from the truck cab. No hand feeding. Special vibratory screen inside tail gate feeds materials uniformly to the auger.

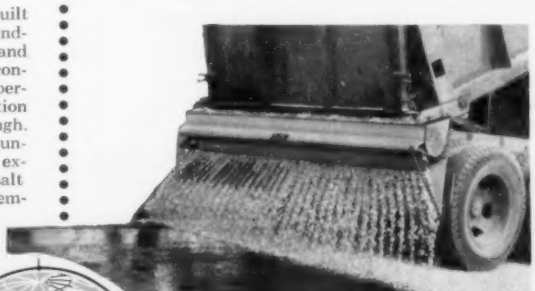
SIMPLEX MODEL HY-8

Simple, rugged spreader built to meet low budgets. Outstanding for spreading cinders and slag. Volume accurately controlled by spring adjusted aperture working in conjunction with roller in spreader trough. Unit designed to handle ungraded material and will do excellent job on spreading salt sand, calcium chloride, chemicals and other finely granulated materials. One-man operated from truck cab —hydraulically controlled

"Works the Year Around"

SEALCOAT MODEL SHY-34

Highly efficient spreader designed especially for sealcoat work. Accurately spreads a sharp, clean margined mat 24 inches to 10 feet in width. Spreads any dry aggregates in sizes up to 1½ inches. Equipped with channeled tray. Operated by one man from truck cab.

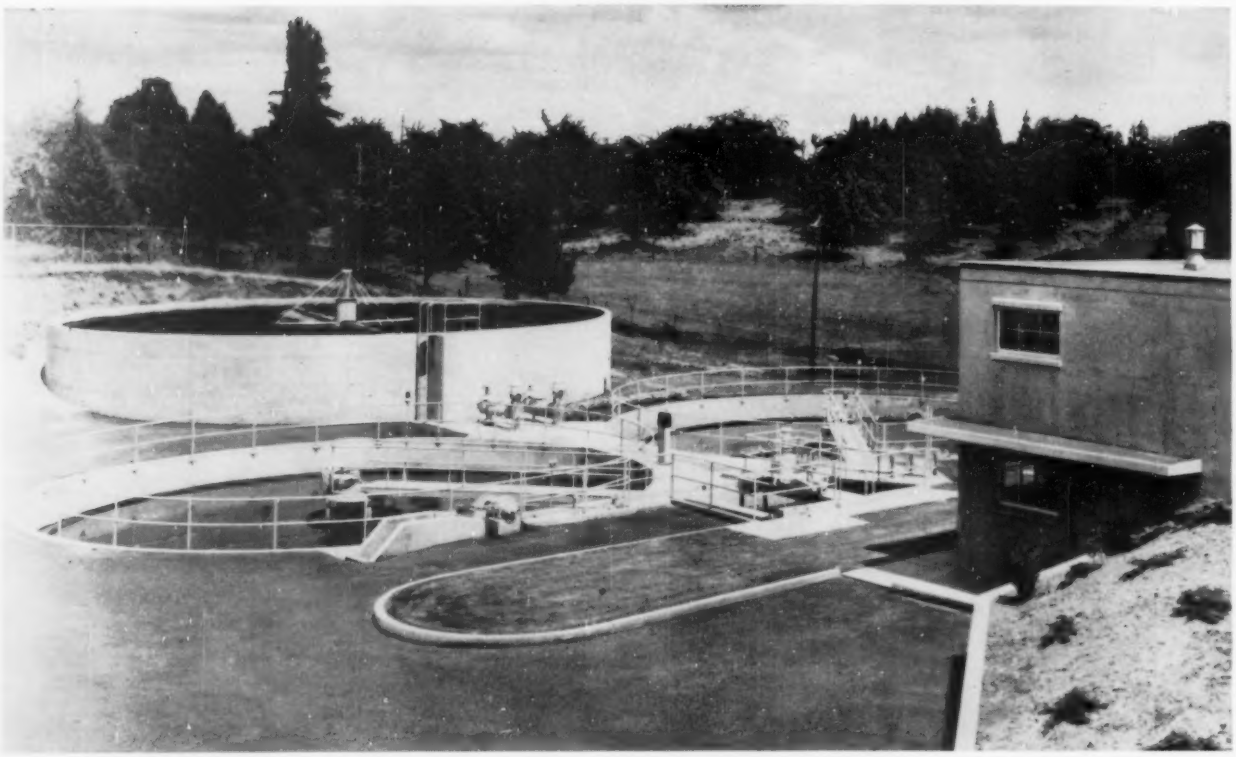


Write, Wire, Phone for complete details on Seaman-Andwall spreaders to fit your need. Get your copy of New Bulletin covering all Seaman-Andwall spreaders and their many unusual advantages. Ask for Bulletin SAC-656.

STABILIZING THE WORLD

S-A SEAMAN-ANDWALL CORPORATION

Dept. I, 266 No. 25th St.
Milwaukee 1, Wisconsin



McMINNVILLE, OREGON

Combines these 6 big advantages of *with TFFI specification vitrified*

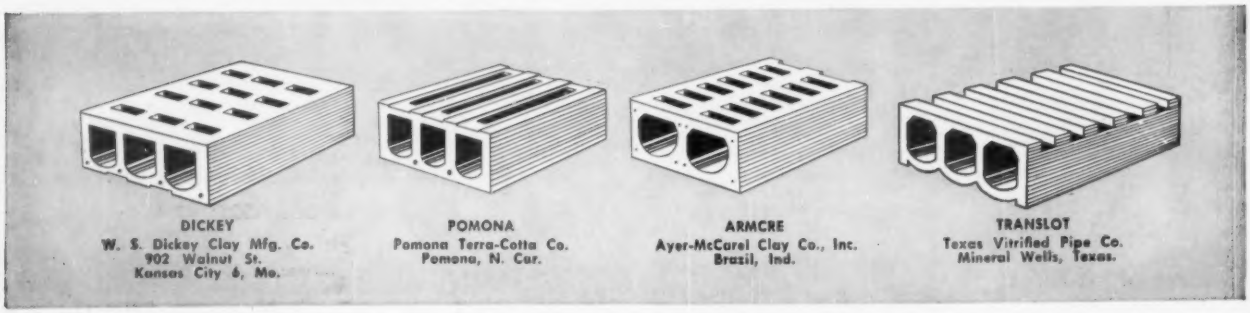
1 LOW COST. First costs are reasonable, and low-cost operation will save your community money.

2 SIMPLE, EASY OPERATION. In most plants one man in a 40 or 44-hour week can do the work.

3 LONG LIFE—longer than the life of the bonds issued to pay for them.

4 GOOD RESULTS—top notch effluent—say 20 ppm BOD, day after day, year after year.

TRICKLING FILTER



DICKEY
W. S. Dickey Clay Mfg. Co.
902 Walnut St.
Kansas City 6, Mo.

POMONA
Pomona Terra-Cotta Co.
Pomona, N. Car.

ARMCRE
Ayer-McCarel Clay Co., Inc.
Brazil, Ind.

TRANSLOT
Texas Vitrified Pipe Co.
Mineral Wells, Texas.

Modern Biofiltration Trickling Filter Plant at McMinnville, Oregon. Photo, courtesy Dorr-Oliver.

CONSULTING ENGINEERS:
Cornell, Howland, Hayes & Merryfield; Corvallis, Oregon.

GENERAL CONTRACTOR:
C. R. Schmiedeskamp, Portland, Oregon.

MAJOR EQUIPMENT INCLUDES:
Dorr Detritor for grit removal; Dorr-Oliver 50′ diameter primary and secondary Clarifier; and 64′ Distributor.

Trickling Filter Plants
clay bottom blocks

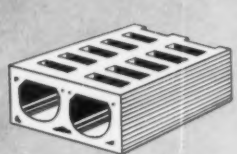
5 RELIABILITY distinguishes their performance always.

6 OVERLOAD IS NO PROBLEM. Take temporary shock loads—or those of a new industry—right in their stride.

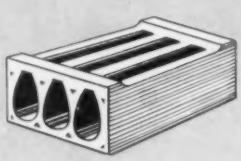
Recommended underdrain Specifications

Standard Specifications for Vitrified Clay Filter Blocks for Trickling Filters are given in full on pages 37 and 38 of the 1954 revised edition of the HANDBOOK OF TRICKLING FILTER DESIGN. These specifications cover types of blocks, compressive strength, absorption, shape, permissible variations, apertures, shell and web thickness, drainage channels, workmanship, markings, testing — everything that an engineer needs to write specifications for trickling filter blocks. Secure your copy from any TFFI member listed below.

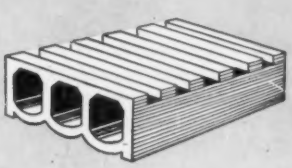
FLOOR INSTITUTE



BOSCO
Bowerston Shale Co.
Bowerston, Ohio



NATCO
Natco Corporation
327 Fifth Ave.
Pittsburgh 22, Pa.



TRANSLOT
Cannelton Sewer Pipe Co.
Cannelton, Ind.

TFFI

Symbol of
good treatment

Consolidated Edison-

On the job at night. The 1956 Ford F-600 shown gives you a choice of 3 Short Stroke V-8 engines and a 133-h.p. Short Stroke Six. Front axle capacity 4,600 lbs., rear axle capacity 15,000 lbs.

On instant call. These three 1956 F-350 express models have doghouse-type shelters for transporting men and equipment. Platform is only 2½ feet off ground for easy loading. Max. GVW 8,000 lbs.

Answering an emergency repair call. Here an F-600 with an all-purpose non-dump body is being unloaded on the job. Maximum GVW 19,500 lbs. Lifeguard steering wheel and door latches standard.

Big Fleet Owners Buy More FORD

- 35 Years with FORD

FORD TRUCKS
Last Longer . . . Cost Less!

The Consolidated Edison Company of New York generates power that moves trains, runs factories and serves millions of homes. For 35 years Ford trucks have played an important part in the transportation department of this company. Today the Consolidated Edison fleet has 183 Fords, from light-duty F-250 express models to heavy-duty F-600's.

They have found that Fords are built stronger for longer life. Ford delivers more! More horsepower per dollar with Short Stroke engines . . . V-8 and Six (based upon a comparison of factory-suggested list prices and net horsepower of all lines of trucks). More comfort with a Driverized Cab . . . only Ford has it. More safety with exclusive Lifeguard features.

For *your* operation it will pay you to look at Ford trucks. Ford trucks cost less . . . Short Stroke engine design for low oil and gas consumption . . . Ford's stronger chassis for longer life . . . and Ford's high resale value. So — from Pickups to 65,000-lb. GCW BIG JOBS, the big fleets are going Ford. See your Ford Dealer for the "cost less" story.

Starting out for on-the-spot repairs. F-350 truck with special maintenance equipment for emergency repairs. For power—either the 133-h.p. Six or the 167-h.p. V-8. Both Short Stroke design.

Checking operation. Here equipment is being checked by Consolidated Edison maintenance men. This Ford F-350 with Vanette body has a 130-inch wheelbase. Fordomatic Drive available on all light-duty models.

TRUCKS than Any Other Make!

FORD TRACTOR-LOADER works every day of the year

With a Ford Tractor and new "Step-On" Loader, you have equipment that can handle many kinds of work, all year around. It's an excellent unit for fast, efficient removal of snow. It is also excellent for maintaining roads and streets, parks and roadsides.

The advanced design of the new Ford "Step-On" Loader allows fast, easy loading, lifting and dumping. Ford Tractors give you greater ease of handling . . . extra power for jobs like loading, dozing and sweeping. They can be equipped to handle a wide range of other jobs, too.

For an investment that will keep paying dividends every day in the year, invest in a Ford Tractor and "Step-On" Loader. See your Ford Tractor and Equipment Dealer right away!

CLEAR LARGE AREAS QUICKLY–Ford Tractor with blade provides ample power to handle heaviest snowfalls. Attach broom to sweep streets and parking areas as the snow falls.

LOAD A YARD A MINUTE–Ford's new "Step-On" Loader provides capacity for a wide range of jobs. Compare it with any loader in its class for ease of handling and safety.

TRACTOR AND IMPLEMENT
DIVISION
FORD MOTOR COMPANY
BIRMINGHAM, MICHIGAN

Ford

TRACTORS

BE SURE TO SPECIFY

TYLOX RUBBER GASKETS

FOR THE SEWER AND DRAIN LINES YOU DESIGN

IN LIVONIA, MICHIGAN*

engineers chose TYLOX Rubber Gaskets for jointing pipe of the city's new sewers. This specification not only solved infiltration problems posed by saturated soils, but sped pipe installation, kept costs down and assured long-lasting *leak-proof* lines.

The Livonia project is typical only of how waste disposal authorities the world over call for TYLOX Rubber Gaskets to assure the success of their pipe projects. Proof of this trend is the fact that there are more TYLOX Gaskets in low head service than all other types of gaskets combined.

Make sure *you* write "TYLOX" when specifying rubber joints. It is unmatched in speed of assembly, ability to make pipe joints leak-proof, and in length of service life. TYLOX is the ONE rubber joint fully meeting *all* requirements of engineers, contractors and taxpayers alike. Write for more engineering details and illustrated case histories on TYLOX RUBBER GASKETS.

***PROJECT:** For City of Livonia, Michigan

ENGINEERS: George Jerome & Company, Consulting Engineers, Detroit, Michigan

CONTRACTORS: Ray D. Baker Contractor, Inc., Detroit, Michigan

PIPE: Tylox-Jointed 18" reinforced concrete, furnished by Superior Products Company, Detroit, Michigan

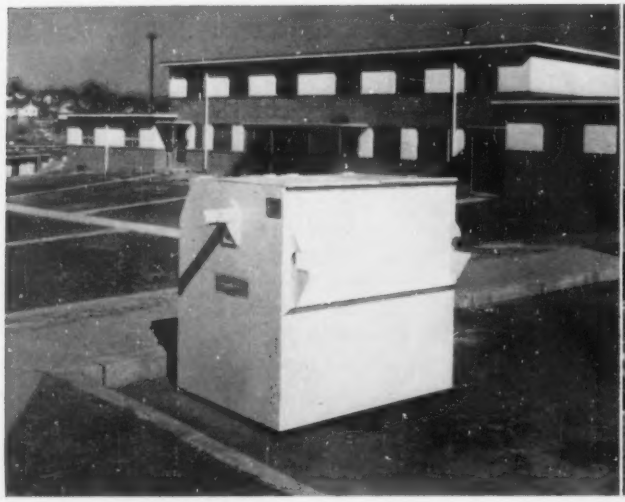
5036

HAMILTON KENT MANUFACTURING COMPANY

KENT, OHIO

427 West Grant St. Orchard 3-9555

NEW DEMPSTER-DUMPMASTER Front-end Refuse



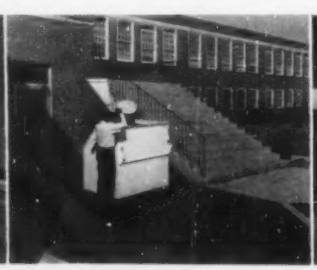
Revolutionary equipment serves scores of containers—picking each up hydraulically and emptying into compaction type body!

The Dempster-Dumpmaster's flexibility includes safe front-end-collection of refuse from conventional cans in alley pick up. Men are always in safe area in full sight of driver.

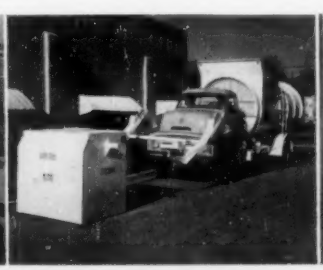
WITH THIS NEW Dempster-Dumpmaster for handling refuse in 1¼, 2 and 3 cu. yd. containers and the Dempster-Dumpster for handling bulk refuse in 6 to 15 cu. yd. containers, refuse collection is now a near-science! Necessity of operating several conventional trucks with crews is eliminated. Unsanitary, fire-hazardous and inadequate conventional trash cans, barrels, etc. can be removed from your business districts, housing and apartment areas, schools, hospitals, etc.

Where containers of limited capacity are preferred, the Dempster-Dumpmaster is the solution to the costly and unsanitary methods of collection because of a multitude of reasons, including: Detachable Containers always remain at accumulation point. They may be placed in or outside buildings. Only one man, the driver, is required for complete operation. It hydraulically picks up each container and dumps refuse into compaction type body for maximum loads. No equipment approaches its flexibility for general service, including safe alley pick up of refuse from conventional cans with only a 24-inch height for dumping cans, and with men always in full view of driver you have safe front-end-collection at all times. Too, it's faster because refuse is compacted while container is being loaded. By promising such extraordinary economies and meticulous sanitation, the Dempster-Dumpmaster merits thorough investigation by any city or town, regardless of size. Ask us to send you complete information. Dempster Brothers, Inc.

Filling Stations are one of many types of service establishments that need fire-proof Dempster-Dumpmaster Containers.



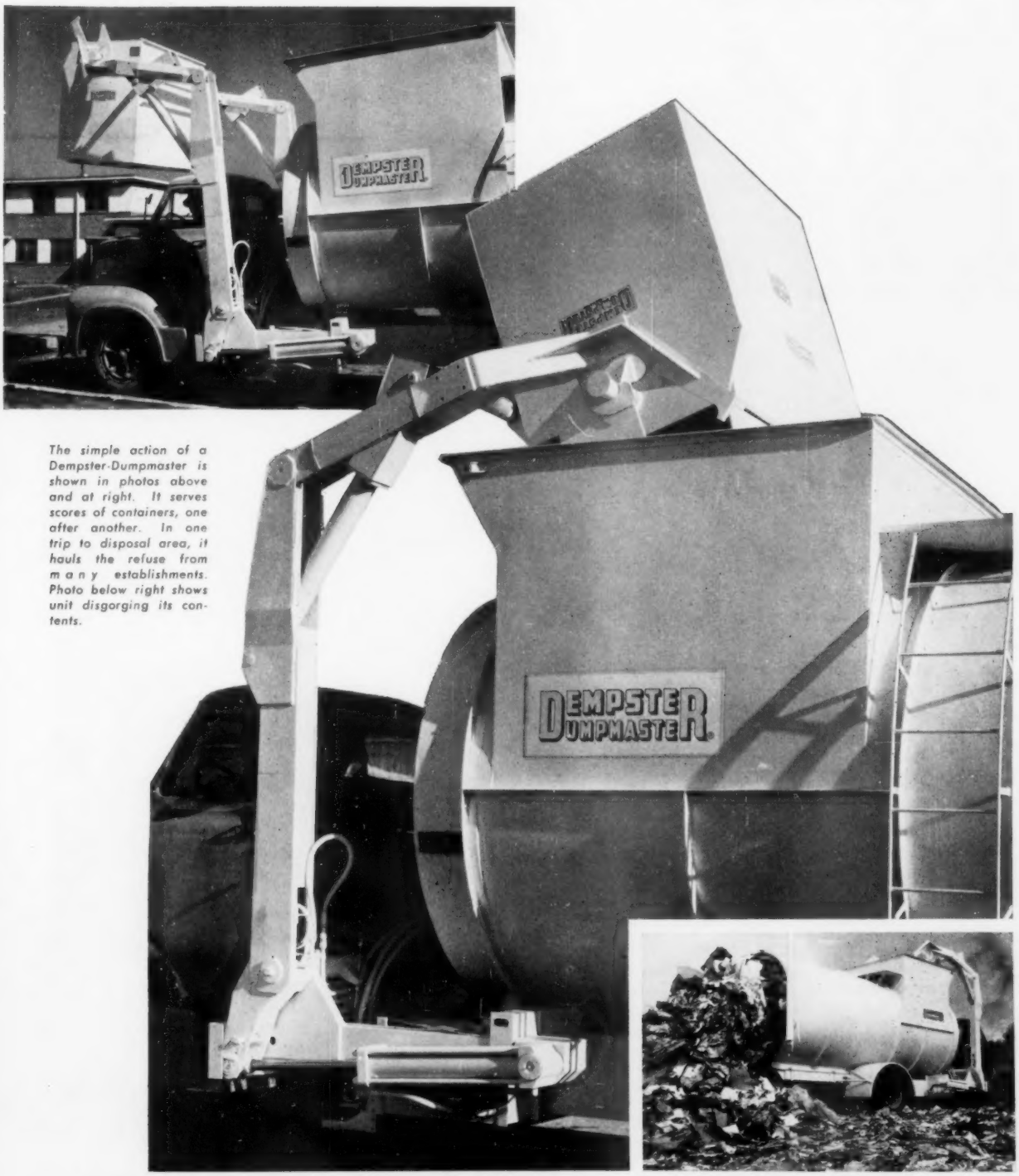
Schools, Hospitals are among the institutions that use these containers; benefiting by the sanitation and low cost.



Restaurants are just one type of many business establishments in your city desiring these scavenger-proof, rat-proof containers.

Casters are available on Containers when needed for location at convenient refuse accumulation areas outside or inside buildings.

gives you Safe, Sanitary Collection at a New Low Cost!



The simple action of a Dempster-Dumpmaster is shown in photos above and at right. It serves scores of containers, one after another. In one trip to disposal area, it hauls the refuse from many establishments. Photo below right shows unit disgorging its contents.

DEMPSTER BROTHERS, 986 Dempster Bldg., Knoxville 17, Tennessee

HEADS OR TAILS

you win

WITH CHAPMAN *Standard* SLUICE GATES

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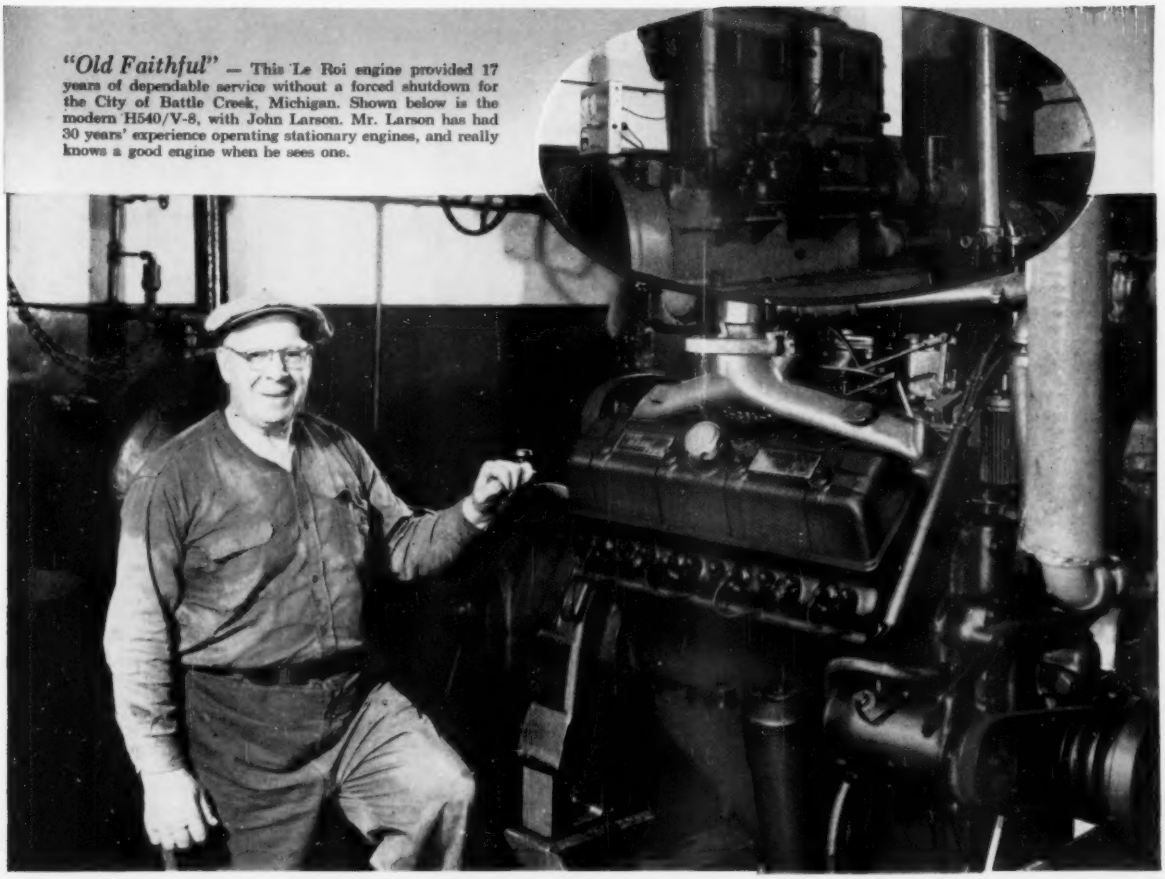
To win both ways . . . specify Chapman Standard Sluice Gates. All of them . . . with manual, hydraulic or electric motor control . . . in an extra large variety of sizes and designs are explained in full in our Catalog 25. Write for your free copy, today.

THE CHAPMAN VALVE MFG. COMPANY
Indian Orchard
Massachusetts



"Old Faithful" — This Le Roi engine provided 17 years of dependable service without a forced shutdown for the City of Battle Creek, Michigan. Shown below is the modern H540/V-8, with John Larson. Mr. Larson has had 30 years' experience operating stationary engines, and really knows a good engine when he sees one.

122,105.6 hours logged with only four overhauls

. . . dependable performance like this proves the value of Le Roi engines

In 1937, the City of Battle Creek installed its first Le Roi engine. Seventeen years later, when it was time to modernize, this engine had piled up the amazing total of hours shown above.

This is just one more example of Le Roi dependability. It is also proof of the excellent maintenance work performed by John Larson and his staff.

In 1954, "Old Faithful" was replaced by Le Roi's H540, a modern short-stroke V-8. The H540 normally operates at 1500 rpm, but, because of its short stroke V-8 design, piston speed is no greater than that of longer stroke, slower speed engines.

Moreover, the H540 provides new flexibility. This flexibility really paid off during flood conditions when the electric pumps were shorted out. The H540 ran up to 2100 rpm and, by so doing, carried the entire plant load for several days.

Performance during this emergency clearly indicated the advantages of the H540's short-stroke V-8 design. It proved that you get more horsepower per dollar and more horsepower per space. Other plus factors are easier servicing and easier installation.

Whether it's for continuous or standby service, or for pumps, blowers, or generators, it pays to use Le Roi engines. Le Roi power is dependable, low-cost power — power that can help ease the tax load in your community. You can get it in sizes ranging to 645 hp., or in custom generator sets from 50 to 350 KW. Write us for detailed information.

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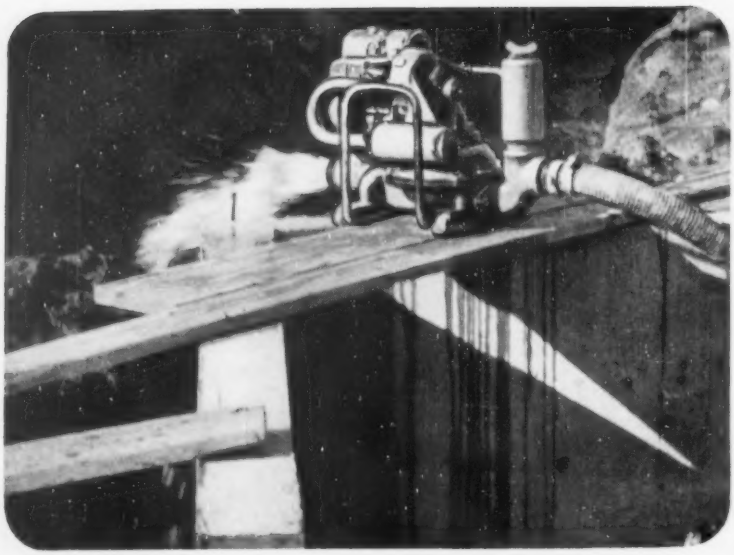
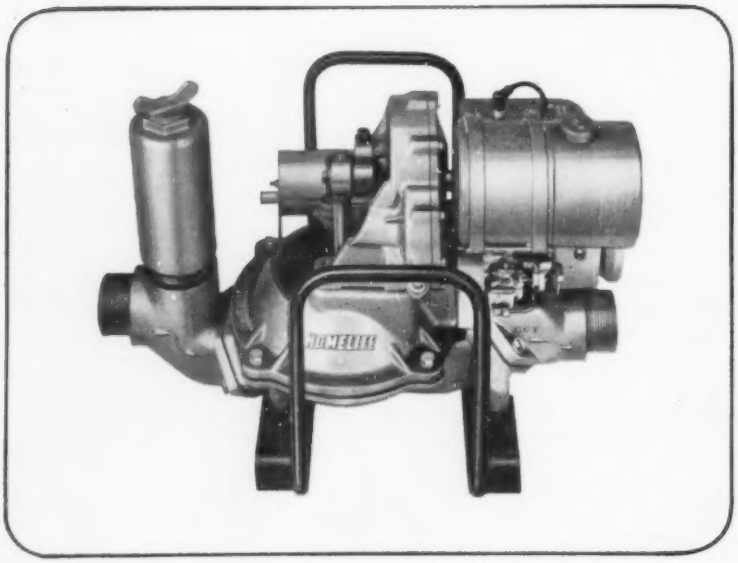


It's here!
The new heavy-duty diaphragm pump that's light enough to carry



Here's the diaphragm pump that goes most easily to the job and does more when it gets there. Specifically designed for continuous, heavy-duty work, this Homelite pump will dewater an area at a 5000 g.p.h. clip, then keep right on going to handle seepage in the thickest mud, muck and sand. Yet, because it weighs only 120 pounds, it gets to the job fast . . . even over the roughest terrain.

The entire unit is built for long, trouble-free operation. Manual throttle control adjusts engine speed for full-capacity pumping or handling small seepage flow . . . gives greater fuel economy and prolongs engine life. Ball and roller bearings protect engine and pump from excessive wear. Totally enclosed reduction gears run in oil. Tough, oil-resistant diaphragm can be easily replaced in ten minutes right on the job.

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NEW HOMELITE
Carryable
DIAPHRAGM PUMP

Model 20DP3-1 has guaranteed total lift up to 28′ and total head up to 50′, including friction.

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A DIVISION OF TEXTRON, INCORPORATED
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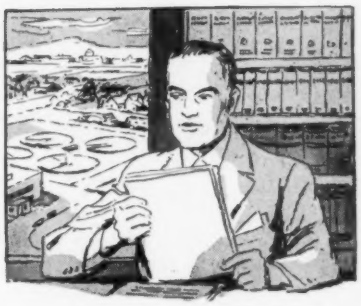


MELVIN NORD,

Dr. Eng. Sci., LL. B.

Registered Professional Engineer

Keep It Clean

Cleaning of streets by a municipality is a governmental function, rather than a proprietary or business function. Therefore, the municipality is exempt from liability for the negligent acts of its employees while they are engaged in this function. This much is clear, and presumably no one would doubt it.

However, in *City of Tulsa v. Hodge*, 293 Pac. (2d) 344, an Oklahoma case decided Jan. 31, 1956, a result was obtained which should make municipalities think twice about their immunity in connection with street-cleaning activities.

On Jan. 9, 1953, shortly after 9:00 P.M., Robert W. Hodge was driving an automobile on Yale Avenue in the City of Tulsa. Edna L. Hodge was a passenger. The car struck the rear of a parked truck owned by the City of Tulsa, injuring the passenger. She brought suit against the City and recovered a judgment. On appeal, the trial court's decision was affirmed.

The court admitted that the City was exempt from liability with regard to its street-cleaning function, but found a neat way around this troublesome rule. It seems the truck in question was a dump-bed truck parked without lights or other signals indicating its presence, and standing unattended with the rear wheels several feet from the curb. The evidence revealed that the reflectors on the rear of the truck were covered with asphalt and did not reflect light. While the failure to keep parking lights on, coupled with the failure to park the truck properly would constitute negligence, it would seem that these would clearly be within the City's exemption. However, the court said that the City was also negligent in failing to keep the rear reflectors clean, so that they would reflect light. And since the City operates a garage for the care and maintenance of its vehicles—and this is a *proprietary* rather than a governmental function—there is no exemption to protect the City from such negligence.

The City contended that the function of operating the garage is merely incidental to the use of the t uck, and that therefore the City should not be liable. The court brushed this aside.

Thus, it seems the City can afford to be negligent in cleaning the streets; but it had better not be negligent in keeping rear reflectors on trucks clean.

It should be noted that municipalities have in the past been held liable for negligence with respect to municipal garages or other buildings, but in most cases the holding is to the contrary if the garage or building is used exclusively for a public purpose. Thus, the holding in the case cited above seems rather unusual.

Ultra Vires in the Sewer

The case of *Spoerl v. Township of Pennsauken*, 14 N.J. 186; 101 Atl. (2d) 855 (Jan. 11, 1954) relates to the legality of a covenant by a municipal corporation releasing in advance certain real property of liability for future assessments.

In 1941 the Township of Pennsauken conveyed title to ce tain lands to the Capital Development Corporation, with deeds containing covenants running with the land releasing the owners of such land from liability for any future assessments for municipal sewerage facilities which might be constructed. The land was later subdivided and sold to a number of owne s who are now being assessed for sewerage developments, contrary to the covenants. There is no doubt that they are the present beneficiaries of the "rights"

given by these covenants, but the question was whether or not the municipality had the power to grant such exemptions. The Court held that the municipality had no such power. In the absence of statute, a municipal corporation cannot exempt property from taxation; such an act is ultra vires (i.e. beyond its legal power). Thus, the owners must pay the assessments.

The reason why municipal corporations cannot, without statutory authority, exempt property from taxation is that this would unfairly increase the tax burden on others not so favored. However, as pointed out in 47 A.L.R. (2d) 1177, the courts are in conflict when it comes to applying this principle. If the exemption is given for an adequate compensation, it would seem that no harm has been done, the compensation merely taking the place of the assessment. In the Pennsauken case, the court said there was no such adequate compensation, since the total purchase price of the land was only one third the amount of the assessment.

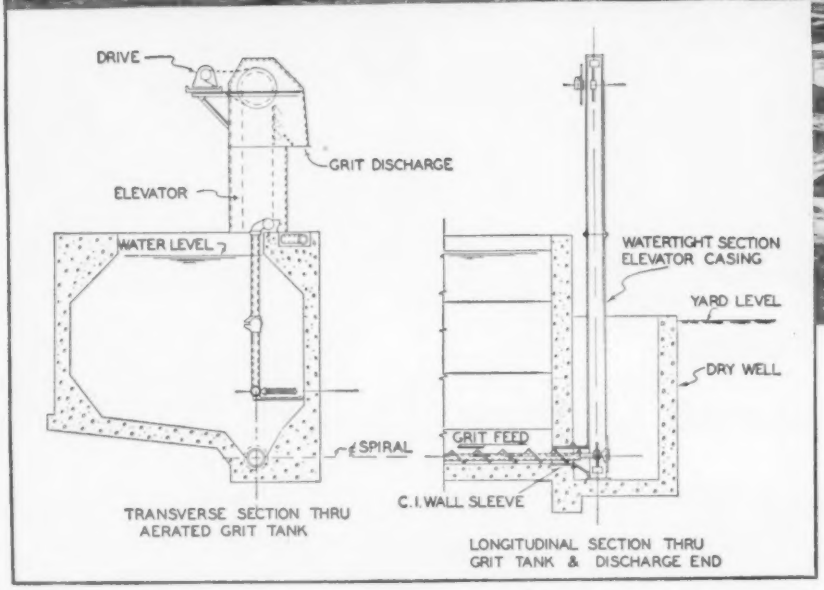
Sewer Cleaning Required

Although keeping the streets clean is a governmental function, maintaining a municipal sewer is not, according to the decision in *City of Holdenville v. Moore*, 293 Pac. (2d) 363, (Oklahoma, Jan. 31, 1956).

Moore brought an action against the City for property damage caused by the backing up of sewage from the City's main sewer line into his basement, in which was kept carpets and household supplies. The evidence indicated that the City had negligently allowed the sewer lines to become clogged with roots and other materials, which caused the backing up, resulting in $1000 damages.

The City argued that the operation and maintenance of its sanitary sewer system was a governmental function, and therefore exempt from liability, but the court refused to "back up" this point of view.

Although there is authority to the contrary in a few states, the majority view is in accord with the case cited above. While a municipality is not bound to construct sewers, nor is it ordinarily liable if a sewer which it constructs with due care proves to be inadequate, it assumes the duty of keeping the sewers it does construct in good repair, because this is regarded as a proprietary, rather than a governmental, function.



The grit basin is rectangular with a sloping bottom to collect the grit under the diffuser tubes. Below the water line, housing of the elevator and spiral conveyor is watertight. The spiral passes through a short tube between the grit chamber and the elevator to prevent grit from passing directly into the elevator boot.

This **JEFFREY** Grit Collector was designed especially for small treatment plants and aerated grit channels

● Grit is allowed to accumulate to considerable depth. Then the elevator is started and run until all grit is removed. The design is such that the spiral acts as a feeder to the elevator, delivering grit only as fast as the elevator can remove it. Can be used either in plain or in aerated grit channels.

Treatment plants throughout the country are Jeffrey equipped—in villages, towns and cities, serving 1500 to several millions; at industrial plants, airfields and similar projects. Jeffrey sanitation engineers offer you complete technical information on plant design and equipment.

Catalog 905 describes Jeffrey sanitation plant equipment. The Jeffrey Manufacturing Company, Columbus 16, Ohio.

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BERMICO comes in light-weight, 8-foot lengths for fast, easy installation. Only BERMICO has a complete line of bituminized fibre fittings, Wyes, Tees, Bends. You can't buy and install root-proof pipe for less.

Your community will thank you for modernizing your plumbing codes to include BERMICO . . . the Modern Pipe for Modern Living. For information, write Dept. EB-8, Brown Company, 150 Causeway Street, Boston 14, Mass.

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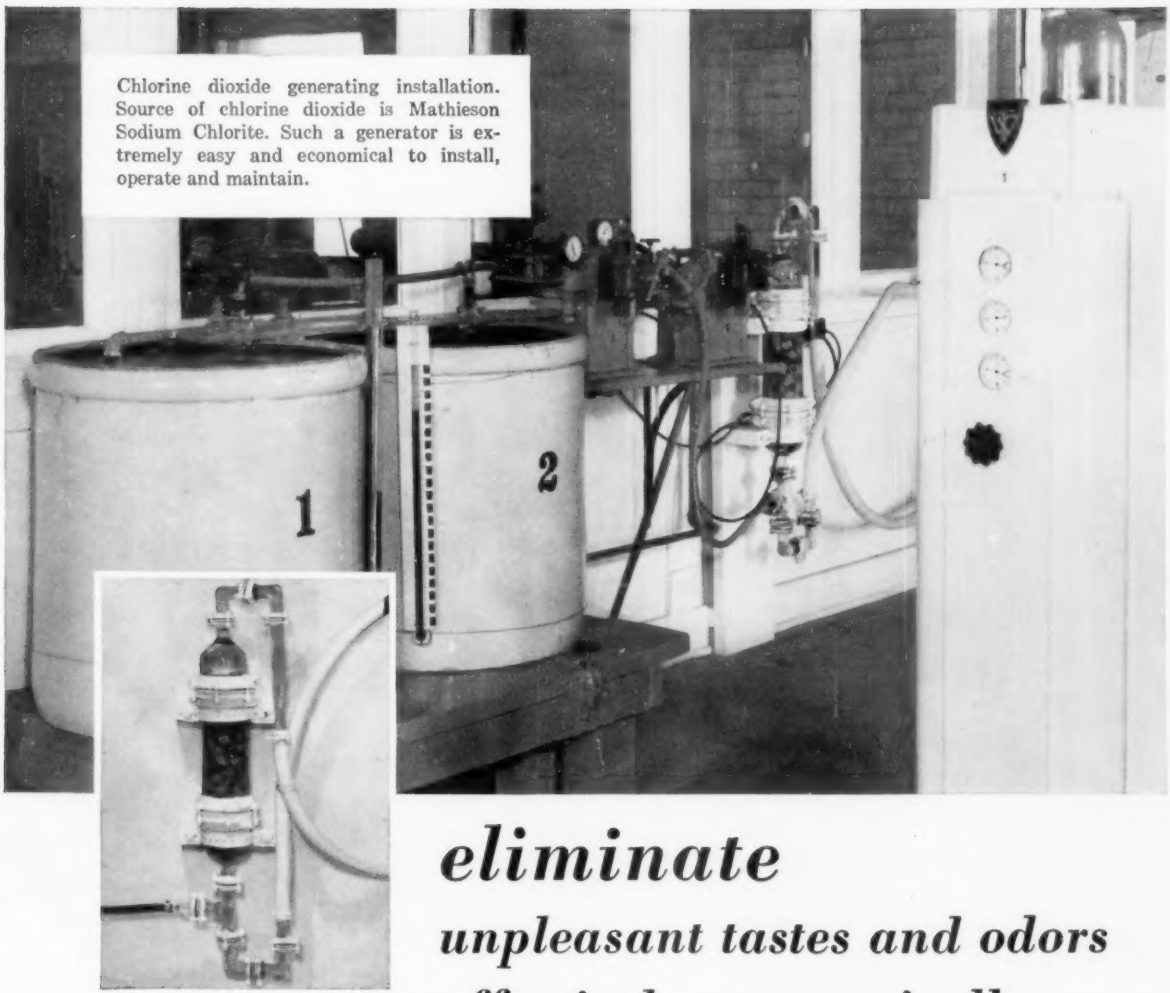

Chlorine dioxide generating installation. Source of chlorine dioxide is Mathieson Sodium Chlorite. Such a generator is extremely easy and economical to install, operate and maintain.

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Please send me technical information about Mathieson Sodium Chlorite as a source of chlorine dioxide for use in municipal water treatment.

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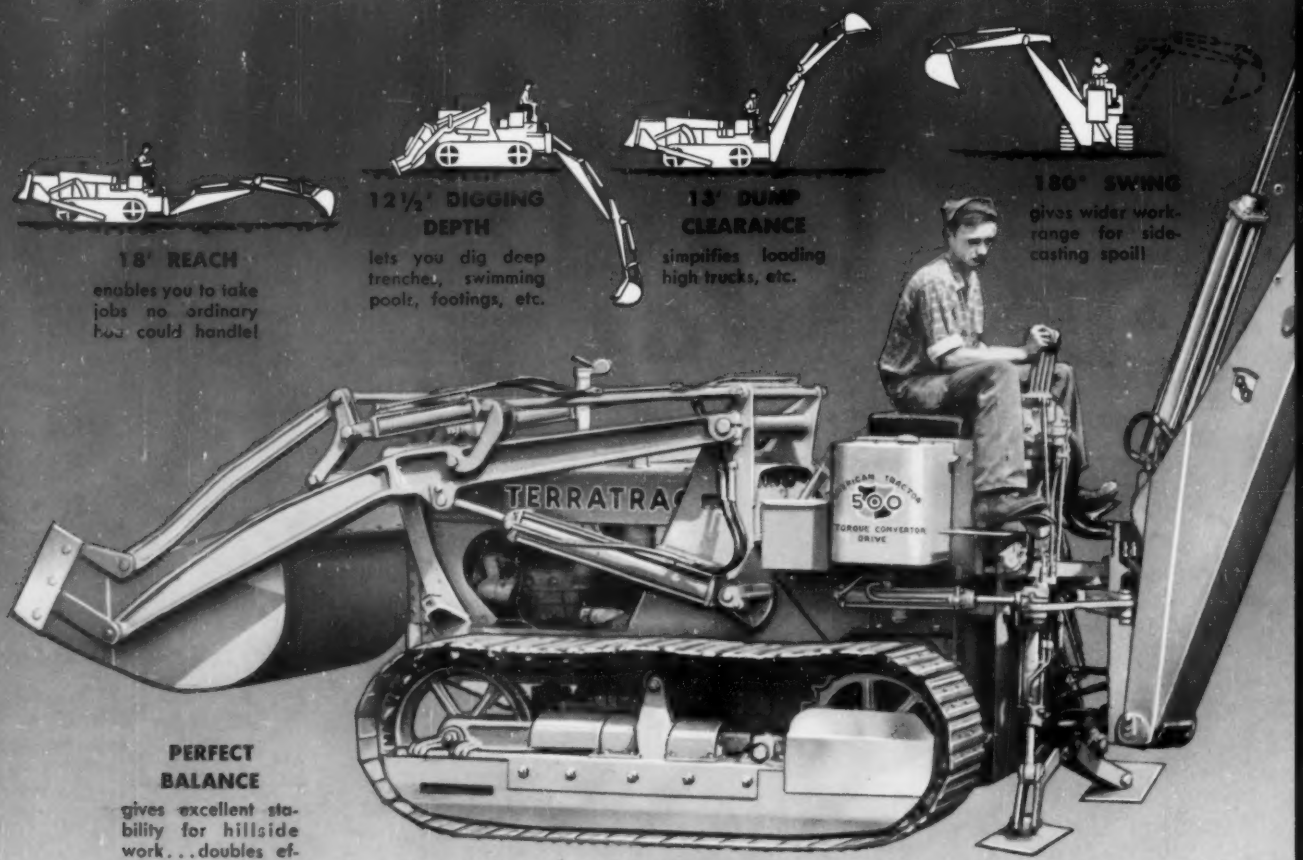

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lets you dig deep trenches, swimming pools, footings, etc.

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simplifies loading high trucks, etc.

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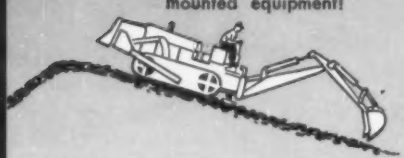
gives wider work-range for side-casting spoil!

PERFECT BALANCE
gives excellent stability for hillside work...doubles efficiency of front-mounted equipment!



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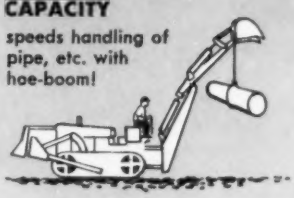
enables same tractor to do backfilling and clean-up!

3000-LB. LIFT CAPACITY
speeds handling of pipe, etc. with hoe-boom!



COMFORTABLE ADJUSTABLE SEAT
— reverses from tractor-seat to hoe-seat in 10 seconds!

Here, for the first time, is a powerful, *heavy-duty* crawler-backhoe — designed and built by a crawler tractor manufacturer — to cut your excavating and trenching costs to rock bottom.

Mounted on the new *torque-converter-equipped* Model 500 TerraTrac crawler, this rugged, cleanly-designed TerraTrac hoe gives you *unprecedented digging and dumping efficiency* — plus important new operating and low-maintenance features never before available on any make of backhoe. Yet, because this entire TerraTrac unit is built by *one* manufacturer, with only one profit, it actually costs you less than most smaller-capacity wheel-type backhoes currently being "adapted" for use with *other* manufacturers' tractors.

Get complete facts on this sensational new TerraTrac hydraulic backhoe from your TerraTrac dealer today. *Ask for a free demonstration on your job,* so you can see for yourself how TerraTrac's 12 exclusive features can help you handle a wider range of jobs...keep working more days per year...at higher net profit, regardless of soil or weather conditions.

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FOOT PEDAL SWING CONTROL
saves time . . . simplifies operation . . . lets operator maneuver bucket while swinging!

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lets you work within inches of buildings, fences, etc.

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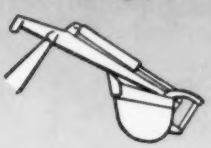
— frees tractor for other uses in minutes!

90° BUCKET ROLLBACK
insures heaping loads without spillage!



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LOW PRICE . . . actually lower than most converted wheel-type hoes. Choice of 17" to 24" bucket width.

RUGGEDLY BUILT for heavy-duty crawler use . . . not an "adaptation". Replaceable bushings at all major wear-points. Minimum of hydraulic "plumbing".

EXTRA POWER . . . choice of 50 HP gasoline or 45 HP diesel tractor, with torque converter drive and extra-large hydraulic pump for tough digging.

TRAVELS ANYWHERE FAST on handy 8-ton TerraTrac tilt-trailer — available at saving of $1000 under competitive trailer prices.

ONE MANUFACTURER, ONE WARRANTY . . . for tractor, hoe, loader, dozer, trailer, etc.

"Just like an extra pair of hands"

Exclusive independent hydraulic foot-pedal swing-control makes it easy for operator to swing the TerraTrac backhoe boom a full 180° with precision accuracy . . . *leaves both hands free to maneuver dipper stick and bucket while swinging.* This saves precious seconds on every cycle . . . enables operator to do twice as much work, with less mental and physical fatigue.

Special bonus to TerraTrac purchasers

Handy 8-ton capacity TerraTrac tilt trailer — available for approximately *$1000 less* than comparable nationally advertised low-beds — gives the TerraTrac backhoe high speed job-to-job mobility behind any light truck. Lets you handle widely scattered assignments quickly and economically with *one man.*

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NOTE: Tractor grousers can be furnished with *rubber* pads (extra), for working over curbs and side-walks without damage.

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Darling "O" ring seals provide a *dry-top, packless* hydrant, minimizing service and maintenance needs and eliminating the hazard of water reaching the operating threads.

This operating surety and low-cost performance of Darling B-50-B hydrants are bonus values that just can't be matched. You can get the B-50-B design in a wide range of Darling hydrant types to meet your particular installation requirements.

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STOP DUST

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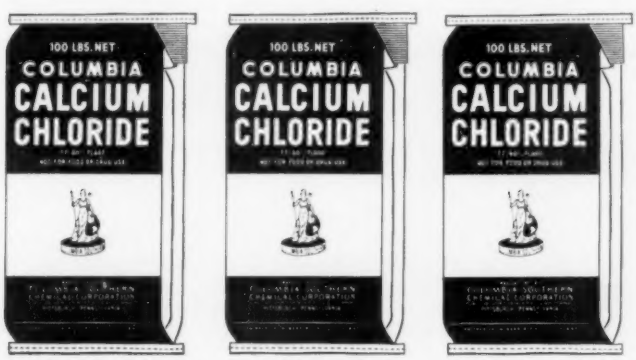
Before Columbia Calcium Chloride is applied, moisture should be present on the road surface. Application after a rain is ideal; otherwise the road should be wetted with a sprinkling truck.

Immediately after wetting, the road is treated with Columbia Calcium Chloride by means of a spreader that gives uniform distribution. Application should be about one pound of calcium chloride per square yard.



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- Make surroundings more healthful
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Columbia Calcium Chloride preserves the natural road moisture, keeps surfaces firm, compact and smooth. Applications can be made quickly, easily and economically. Roads give excellent year 'round performance with a minimum of attention.

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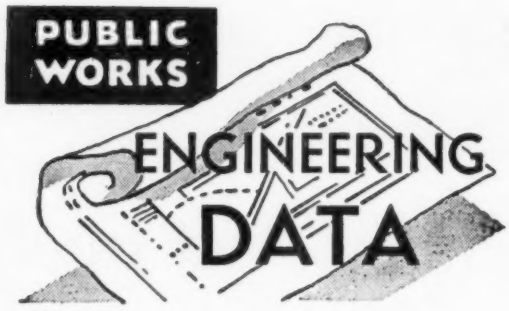

County Engineers' Salaries

The County and Local Roads Divisions of ARBA made a survey of county highway engineers' salaries in 1955 and the results of part of this survey follows as to the minimum and maximum salaries of county engineers in various states.

State	No. of Counties	Minimum	Maximum
Ohio	88	$5,400	$10,500
California	45	6,000	17,500
Alabama	61	4,800	8,400
Iowa	99	4,000	8,000
Michigan	51	4,200	20,360
Massachusetts	5	7,200	8,750
Kansas	101	3,000	7,200
Washington	39	4,560	12,000

Sylvan Yellow Fever Mosquito Vector in the United States

In the course of six years of study on the tropical American mosquitoes of the genus Haemagogus that are associated with the wave of sylvan yellow fever currently passing across Central America, it came to be recognized that some of these mosquitoes are associated with a semiarid scrub-type vegetation. This is in marked contrast to the long-held belief that Haemagogus mosquitoes occurred only in tropical rain forests. At any rate, the finding of two species of Haemagogus at elevations in excess of 400 feet in semiarid areas of southern Mexico led to the hypothesis that members of the genus might inhabit similar situations at lower elevations as far north as southwestern United States.

After a review of available information on the physiography, climatology, and vegetation of the Mexican gulf, several areas in the Rio Grande basin were selected for survey in late August and early September of last year when rainfall and temperature conditions were most favorable for the breeding of Haemagogus. One of these areas was the delta region of the Rio Grande in the vicinity of Brownsville, Texas. This area is largely under intensive cultivation, but it was possible to find occasional patches of thorny scrub vegetation along relatively moist depressions that are locally known as "resacas." Larvae and pupae of Haemagogus equinus were collected from water in three tree holes in a patch of thorn scrub off Texas State Highway 48 near the intersection with Farm Road 1792, five miles northeast of Brownsville; and from a tree hole 15.7 miles east of Brownsville on Boca Chica Boulevard.

Haemagogus equinus, which occurs at least as far south as Colombia, is a proved vector of yellow fever in the laboratory, but virus has not been re-

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Rugged work requires rugged equipment and that's exactly what you get with Wagner "Torture Tested" tractor equipment. Every stress point is *doubly* protected. Heavy-duty construction keeps maintenance costs way down and productive time way up. Wagner equipment stays on the job day in and day out working for you and more profits. No wonder Wagner tractor equipment is recognized as so far superior it has become No. 1 in America by a wide, wide margin. See all the rugged features of Wagner tractor equipment and the numerous attachments that can make a tractor your most versatile piece of equipment. Get proven dependability no matter how tough the job. Get Wagner tractor equipment today.

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covered with certainty from it in nature. It was, however, the only species of Haemagogus found in immediate association with the epizootic of yellow fever on the northern coast of Honduras in 1954. (Trapido H., Galindo, P., Discovery of Sylvan Yellow Fever Vector in the United States: Science, Vol. *123*: p. 634, 13 April 1956 via Navy Medical News Letter).

Record Size Aerial Survey of Dade County, Florida

Photographic operations for an aerial survey of 800 square miles of Dade County, Florida, have been completed by the Abrams Aerial Survey Corporation of Lansing, Michigan. Requested by the county engineering and the tax assessing department, the survey will be used for planning and assessment study. The photography at a scale of 1″ = 1320′, or a quarter of a mile to the inch, was taken, as is customary in such work, with an over-lap in the pictures so that by use of a stereoscope changes in elevation of the terrain can be determined.

Infectious Hepatitis and Gamma Globulin

The effect of mass inoculation with gamma globulin to confer immunity against infectious hepatitis is discussed in the *Medical News Letter*, U. S. Navy of June 8th. Following an outbreak of 25 cases at a Marine Air Base in Korea in 1955, personnel components with the largest incidence of cases were inoculated with gamma globulin. Six cases occurred after the initial mass inoculation, 4 of which were among 1627 uninoculated personnel. Of the 2 occurring among the inoculated group (1710), 1 became apparent 4 days after gamma globulin was administered and the other was a suspected, unproven case. No cases of infectious hepatitis occurred during the 3 months following, among either group. It is known that immune gamma globulin will provide passive protection against infectious hepatitis for 6 to 8 weeks, but the complete absence of the disease in this case for 3 months in spite of the constant arrival of newcomers was unexpected.

It was indicated that one or all of the following factors may have accounted for the sparsity of cases following mass inoculation: Members of the uninoculated group were sufficiently separated from the higher disease incidence components that there never was a large number of infected individuals available to transmit the disease; improved sanitation practices among all base personnel acted to diminish transmission of the virus; the number of immune individuals was sufficient to curtail the spread of the disease on the base.

The Shortage of Scientists and Engineers

A recent editorial prepared by the McGraw-Hill Department of Economics states that we have a working force of more than 600,000 engineers, over twice as many as the 286,000 there were in 1940. The number of scientists has increased from 92,000 to about 250,000 since 1940. Today about one in 80 persons in the labor force is a scientist or engineer. The minimum need for engineers from graduating classes is 40,000 each year for the next ten years. Last year 23,000 engineers were graduated. It is indicated that the 40,000 current annual requirement will not be reached until 1963.

Ten-Year Sanitary Landfill Program at Jackson, Mississippi —an Outstanding Example

City now operates several sites, handles all refuse at one-fourth former cost

The city of Jackson, Mississippi, switched to the sanitary landfill method of handling its refuse back in 1945. Now its 25 trucks pick up approximately 40,000 tons of rubbish and garbage a year, take it outside the city where landfill operations appropriate to each site are carried out.

The newest of Jackson's tractor equipment is a 2¼-yd HD-11G tractor shovel, the third new Allis-Chalmers tractor purchased by the city in the past three years. The operator says that this new 11G does the job clean and fast, and made a particular point about its ability to handle tough digging. With the unit operating according to the trench method, it is an important advantage for the 11G to be able to cut even when the ground is particularly hard.

The result — where there was formerly only useless land, now there are golf courses and parks.

The method — sanitary landfill. Here refuse is crushed and compacted against the ramp end of the trench.

The equipment — an Allis-Chalmers 2¼-yd HD-11G tractor shovel. Here it cuts cover material by extending the trench, spreads it over the refuse to provide a sanitary seal.

The new HD-11G is becoming an increasingly popular municipal unit. With 105 net engine horsepower, 2¼-yd bucket capacity and 32,000 lb of balanced weight, it can handle a wide variety of jobs efficiently and at low cost. Your Allis-Chalmers dealer will be glad to give you all the facts, plus an on-the-job demonstration. Call him today.

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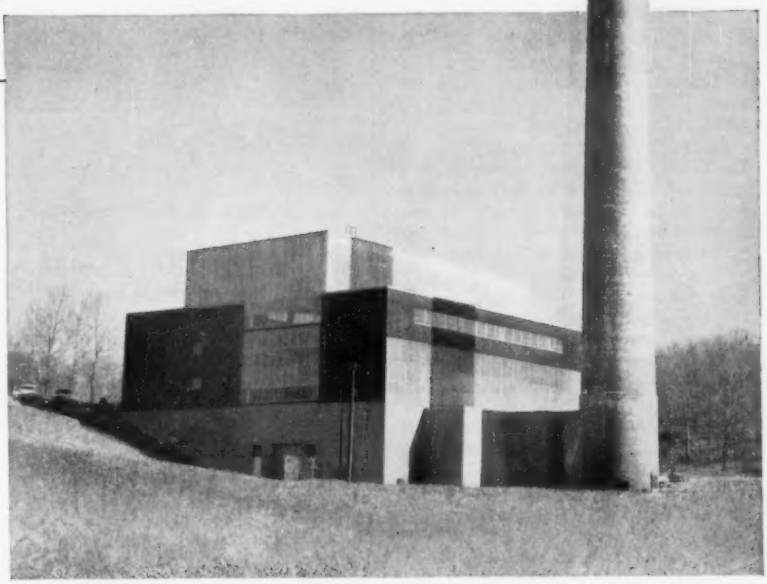
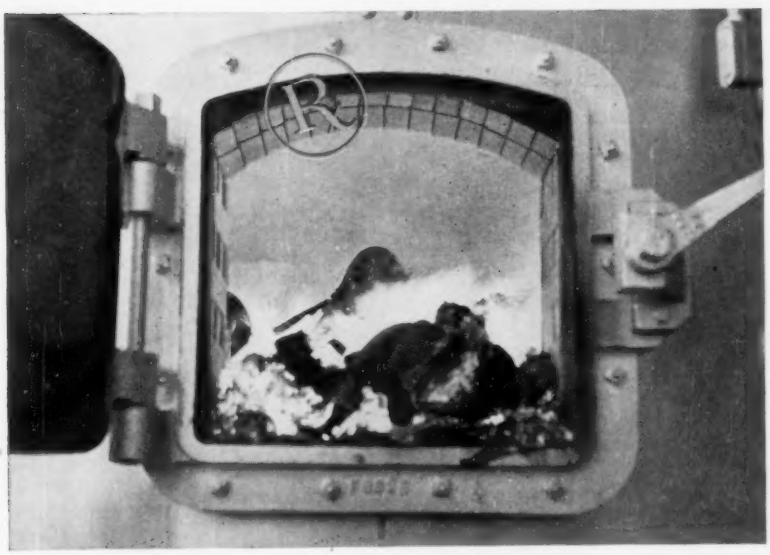
Another Norton Rx *on the job!*

CRYSTOLON refractories specified for furnace lining and other critical areas in new, million-dollar municipal incinerator*





This new $1,000,000 incinerator — designed by Anderson-Nichols & Co. of Boston, Mass., Consulting Engineers, with equipment designed and constructed by Nichols Engineering and Research Corp., New York, New York — is one of the country's newest and most modern. Norton CRYSTOLON refractory shapes have important uses in its combustion system.

CRYSTOLON refractory brick and special shapes, shown around a furnace access door comprise one of the Norton Rx's — *engineered and prescribed* refractories — in the new incinerator. CRYSTOLON brick also lines the interior walls up to about three feet above the grate line, and is further used in the settling-out area, between the combustion chambers and stack.

Another good example of how designers and builders of the most modern incinerator and power plants are specifying Norton *engineered and prescribed* refractories.

In this big new incinerator CRYSTOLON brick and special shapes are used around the access door and interior of the furnace, as shown. CRYSTOLON brick is also used, in both solid and checkered construction, to make up the baffle walls in the settling-out area.

CRYSTOLON refractory material in the furnace areas provides great resistance to slag caused by bottles, cans and other abrasive refuse. In the baffle walls it is valuable for its ability to reduce erosion due to fly ash. And in all locations it will withstand temperatures up to 3050°F . . . combines great physical strength with exceptional resistance to thermal shock, slag penetration and chemical attack . . . and has up to 15 times the resistance of ordinary fire clay to erosion and corrosion.

Investigate Norton Rx's

for your own furnace operations. Learn how they can save you time, work and money. See your Norton Representative or write to NORTON COMPANY, Refractories Division, 227 New Bond Street, Worcester 6, Mass. Canadian Representative: A. P. Green Fire Brick Co., Ltd., Toronto 5, Canada.

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Dodson's Digest

How to cut highway accidents with Calcium Chloride

Finally got a chance to play golf with Lou Norris last weekend. Lou is one of the best county highway engineers around, but to hear him talk you'd think golf was his profession.

On the way out to the golf course, Lou was babbling on about birdies and pars, as usual. "Lou," I said jokingly, when he paused for air, "if you spent as much time on dust control as you do on golf . . . "

"You're wasting your breath, Dod," Lou grinned. "I've already done everything you told me to. I use Calcium Chloride on highway shoulders and secondary roads.

"What's more," he continued, "on smaller roads, like the one we're on now, I make Calcium Chloride available to the residents. Now as I was saying, when I reached the fifth tee..."

Rounding a curve, we came up to a main highway. As we approached the intersection, our car was practically buried in a cloud of dust.

"Great Scot!" Lou exclaimed excitedly. "They ought to do something about this dust! We can't see where we're going. Cars on the highway can't see us coming . . . "

"You're right, Lou," I broke in. "It's a real hazard. But they could treat these side-road intersections with Calcium Chloride at the same time they're working on highway shoulders. Driving would be safer. And it wouldn't cost much extra."

"You know, you're right," Lou beamed. "And they should do it pretty quick, too . . ." Just then the dust settled, to reveal a county pickup truck parked off the highway.

"There are the people to call, Lou," I said, pointing at the lettering on the truck door. Lou turned and stared at it for a long minute, and then turned to me and grinned. "You knew this all along, didn't you, Dod?"

"Knew what?" I asked, straight faced.

"That we're still in my county," he replied, motioning to the driver of the pickup . . . —L. D. DODSON

P.S. — Our leaflet, "How to Stop Bothersome Dust," tells how Wyandotte Calcium Chloride solves dust problems, and how to use it to best advantage. Drop me a line, and I'll be happy to send you a free copy. *Wyandotte Chemicals Corporation, Wyandotte, Mich. Offices in principal cities.*

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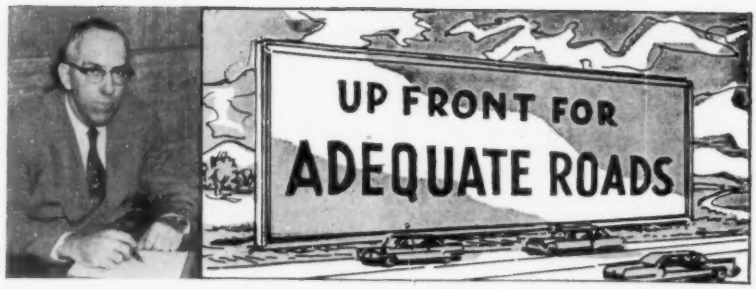

by LEO J. RITTER, JR.

Highway Consultant

They Did It — It obviously is not news that the Federal Congress enacted the new federal highway bill and the President signed it into law, just before the end of June. Passage of the bill was not without pulling and tugging, but it marks a milestone in the history of highway development in this country.

Congratulations to all concerned. It is amazing how, at the end, all the groups concerned cooperated so well in working toward the same goal. Many individuals and organizations put a tremendous amount of time, effort, and money into convincing the Congress that there really is a highway problem and that something must be done now, or the problem would get worse. Sure, there are selfish interests involved; but in the end the interests of the people were well served.

As all know, the bulk of the program—about $25 billion over a 13-year period—will go to construction (or improvement) of the National System of Interstate Highways. Federal funds will, in general terms, provide 90% of the cost of construction, with the states providing the remaining 10%. Although many journalists seem to have the idea that this is a completely new system of superhighways, such is not the case; the bulk of the mileage on the Interstate System has been established for several years. Remember where the Interstate System got its public start?—in the 1944 report on Interregional Highways.

Obviously, the new program is not going to solve the country's highway problem overnight. By the time the program is halfway completed, it undoubtedly will have to be increased in magnitude, since better roads breed more cars. Nonetheless, it is a tremendous step forward. Incidentally, if you have a boy who has just completed high school and is looking for a career with a future, send him to school to become a highway engineer.

Quotable Quotes — An address given by Herschel D. Newsom, Master of the National Grange, at the Sixth Highway Transportation Congress (sponsored by the National Highway Users Conference) was full of "quotable quotes". With reference to local roads, these are some of the things Mr. Newsom said—

"One of the first things needed to improve roads in many counties is better administration."

"Road authorities are generally agreed that the county unit plan is the most efficient method of administering local rural roads. . . County highway construction and maintenance should be under the direction of a competent engineer with adequate practical experience, and accountable to the Commissioners for general policy. Such a system encourages uniform cost accounting, more efficient use of road building and maintenance machinery, better cooperation between local, state and Federal authorities, and greater progress in programming and long-range planning."

"Every county should have a continuing long-range plan. To accomplish this, a county might set up a highway planning committee whose membership could be as follows: The county highway engineer, and a representative of the state highway department; farm organization representatives; automobile and truck owners; rural letter carriers, and school bus representatives. Such a committee could recommend a rating of county roads from which could be derived a priority schedule for road improvement. Such committees are already operating successfully in many counties."

Increasing Productivity — Attention continues to be focused upon methods of increasing productivity in highway engineering—one method for offsetting the continuing shortage of trained technical personnel and growing work loads. As previously mentioned in this column, emphasis is being placed principally upon aerial photogrammetry and

CLAY PIPE TRUNK SEWERS

Give Taxpayers More For Their Money!

SAN BERNARDINO, CALIFORNIA recently installed another 40,000 feet of Vitrified Clay Pipe to serve the needs of its rapidly growing population. The new lines meet an urgent need because San Bernardino, "Gateway to the California Mountain Resort Areas," has expanded from 56,000 people ten years ago to more than 80,000 today. With the addition of this latest Clay Pipe project, the entire incorporated area of the city is now served by a modern sewerage system.

San Bernardino is giving its taxpayers the most for their money by installing the only pipe that never wears out. No matter how large the city may grow . . . no matter what industrial wastes may be introduced into the lines . . . Clay Pipe is *sure* to last. Chemicals can't corrode it—time can't weaken it—generations of constant use can't cause it to fail. Vitrified Clay Pipe safeguards public health *permanently.*

The "Del Rosa" and "Rialto Bench" trunk line projects at San Bernardino were designed by the Currie Engineering Co. Construction was carried out by the Encon Corp., Los Angeles.

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C-656-1

Progress in Public Health - Through Clay Pipe Research

the use of electronic computers. One of the recent meetings in this area of interest was held at Georgia Tech in July, under the sponsorship of the Bureau of Public Roads, the Georgia State Highway Department, and the Georgia Institute of Technology. Nine panel discussions were held during the three-day conference, covering such topics as electronic computation in highway location, design, and construction; electronic computation in traffic studies, inventories, costs, and bridge design; and increasing productivity through plan simplification, photographic reproduction, and other time saving methods and devices.

Meanwhile, State Highway Engineer G. T. McCoy of California has announced that a new unit has been established in the State Division of Highways to expand and improve the state-wide photogrammetry program. The new unit, headed by L. L. Funk, will not only be responsible for developing a state-wide photogrammetry program, but will carry on research to improve the quality and usefulness of photogrammetric processes and equipment and will disseminate information to the various field districts.

What's New? — What's new with you? What's new in your work or your facilities? What would you like to see discussed in this column? Come on, let us hear from you once in a while. We can't give away any prizes for the best letters, but we do promise to read them all and use as many of your ideas as possible.

Rambling — In recent months, we've had the opportunity to attend two very fine press conferences. One of them—last spring—was put on by International Harvester at its Melrose Park tractor works, just outside of Chicago. They really have a tremendous set-up there, turning out TD-24's and other tractor units just about like an automobile assembly line.

The other was held by Massey-Harris-Ferguson at their Product Education Center near Sturtevant, Wisconsin. Purpose of this one was to introduce their new line of light to medium wheeled tractors—the Work Bulls and Pit Bulls. A long time major manufacturer in the farm equipment field, M-H-F is going all out for a share of the business in construction, municipal work, materials handling, etc. Units demonstrated at Sturtevant are fast, easy to handle, powerful, versatile, and economical. They have an amazing array of attachments—backhoe,

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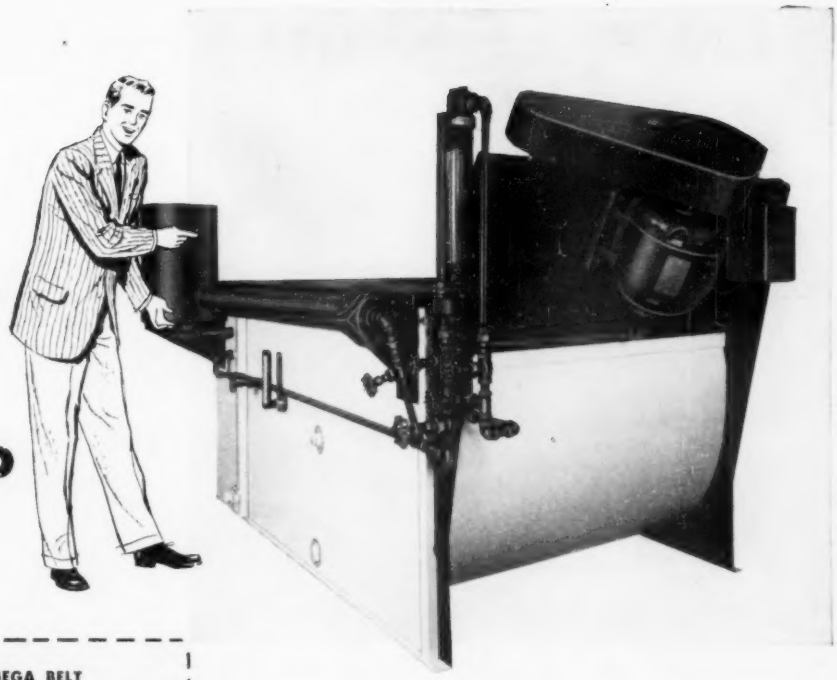
dozer blades, fork lifts, ditcher, pipe layer, and so on.

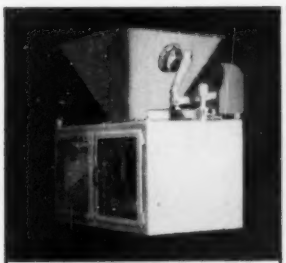
Short Courses — Your writer has caught, in passing, word of two very interesting short courses. One of these is coming up—if you read this copy soon enough—August 6-10 at Purdue University, Lafayette, Indiana. It is an intensive short course in the Engineering Aspects of Traffic Operation. The course is sparked by Don S. Berry of the School of Civil Engineering. Emphasis will be placed upon traffic engineering problems in urbanized areas, with important principles being presented by nationally recognized specialists. Members of the "faculty" will include John Baerwald (Illinois), George Barton (Northwestern), Fred Hurd and T. J. Seburn (Yale), Norman Kennedy (California), and Harold Michael (Purdue). Should be very worthwhile.

A short course of a very different sort is one which has been traveling around New York State since April. It is a 5-hour course in Location and Evaluation of Gravel Sources for Highway Use. This extremely practical course has been given to relatively small groups of local rural highway superintendents. Material covered in the course includes basic geology and formation of gravel deposits, methods of locating possible deposits, factors to be considered in opening and working a deposit, and combining sources of gravel for satisfactory gradation. The course is under the supervision of J. W. Spencer of Cornell University.

Thither and Yon — Construction will be started soon on the first of six commercial heliports in Manhattan; location will be at the intersection of West 30th Street and the Hudson River. . . The Tennessee State Highway Department is in the middle of the largest construction program in its history—about $50,000,000 this year. . . The recently completed Alameda Bridge, which crosses the Rio Grande just north of Albuquerque, is the first precast, prestressed concrete highway bridge built by the New Mexico Highway Department. . . Pending review by the State Supreme Court, the Florida Turnpike Authority has been authorized to issue $185 million in bonds to finance the extension of the Turnpike from Fort Pierce north to Tisonia, 17 miles south of Jacksonville. . . Don't forget ARBA's National Highway Conference for County Engineers and Officials to be held at Mackinac Island, Michigan, September, 17-19

it's Ω OMEGA for MECHANIZED SLAKING





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- **Like all B-I-F products,** OMEGA Lime Slakers have consistently proved why "the best costs less". OMEGA'S complete line enables you to standardize on *one* dependable source of chemical feeders. Free yourself from the nuisance and expense of divided service and responsibility.

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One **Cat-built Traxcavator*** handles all sanitary landfill for Abilene

The city of Abilene, Texas, has solved its garbage disposal problem with a CAT* No. 6 Traxcavator—a one-man machine that clears land, digs trenches and compacts and covers sixty 14-yard loads of trash and garbage every day.

E. L. Gann, Assistant Superintendent of the Abilene Sanitary Department, tells the story this way: "We saw a motion picture on sanitary landfill, got interested and asked for a demonstration. After seeing the No. 6 work we bought it on the spot—never moved it away from the demonstration site. It's been working ten months, doing a good job."

Abilene uses its No. 6 efficiently, covering the refuse with fresh dirt taken from the new trench which it digs on the same pass. The acreage for landfill was useless lowland, bought at a cheap price. After filling and raising, it will be used for industrial sites—a double gain for the city. For clearing brush from additional land, the bucket can be removed from the No. 6 and a bulldozer attached in only 20 minutes.

Today the new No. 977 Traxcavator replaces the No. 6 in the Caterpillar line. Its 96-inch, 2¼-yard bucket has a full 40-degree tip-back at ground level to hold the load. And a lift of 11½ feet provides ample dumping height. Fast, one-hand operation of bucket controls with automatic kickout and bucket positioner speed up cycle time. Comfort and visibility are given by the high, well-cushioned seat.

Ask your Caterpillar Dealer to show *you* his landfill motion picture or give you an on-the-job demonstration. He'll be glad to do both.

Caterpillar Tractor Co., Peoria, Illinois, U.S.A.

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**NAME THE DATE...
YOUR DEALER
WILL DEMONSTRATE**

PUBLIC WORKS

August 1956 • Volume 87, Number 8

PREPARATION FOR WINTER on a State-Wide Basis

G. G. LOVE

Maintenance Engineer

Department of Public Works

Commonwealth of Massachusetts

WINTER MAINTENANCE operations in Massachusetts involve approximately 2200 miles of state highway of which almost 300 miles are either dual type or single roadway 40 feet or more in width. In addition to the state highway mileage, about 500 miles of town roads are plowed on a cooperative basis.

Our state highway network, consisting of approximately 100 marked routes, extends from the seaboard westerly to the Berkshire Hills, a distance of practically 150 miles, and from the Rhode Island and Connecticut Borders northerly to Vermont and New Hampshire, a distance varying from 40 to 100 miles. Highway elevations vary from sea level to 2200 feet. Snow may be expected in some areas as early as November 10 and as late as April 10. Freezing temperatures may occur as early as September 1 and as late as June 1 in the higher altitudes.

Three trunk lines traverse the state from east to west crossing three ranges at high elevations and passing through belts of varying climate in which warm rains, sleet and sub-zero blizzards may occur simultaneously at different locations depending upon the altitude.

The problem of snow and ice control is becoming increasingly difficult as a result of the current expansion of the metropolitan areas. Many miles of highways which were

● V-PLOW, mounted on truck, widens roadway after initial round of plowing.

designed and constructed for service under suburban or rural conditions have become arteries for daily commuting traffic and are subject to peak loads far in excess of their designed capacities. Roads in this category radiate from all of the metropolitan areas in the state.

The three major metropolitan areas are Boston, Worcester and Springfield. It is estimated that about 200,000 vehicles enter the Boston area from State Highways daily and that a similar number make the return trip, while about 60,000 vehicles enter and leave each of the Worcester and Springfield areas.

The state is generally subject to two types of winter storms. In the Eastern half of the state and Cape Cod, hail, sleet and freezing rain occur frequently during the winter months, but several snow storms can also be expected, each with a fall of 4 to 12 inches. The other sections of the state are subject to more frequent and heavier falls of snow, but less freezing rain. The northwest portion of the state receives the most frequent and heaviest snowfall. A large portion of the state is within a belt where several cycles of freezing and thawing occur almost daily, so that conditions change from safe to hazardous, frequently and suddenly. Sections of road which may be entirely dry during the day become suddenly covered with skim ice as the result of the freezing of condensation.

Organization for Winter

Basic preparations for maintenance operations have taken the form of long range planning. Each of our seven districts is divided into

● DISTRICT garages, about 40 by 100 ft., provide headquarters for the foreman and permit storage of four large snow units without removing wings or plow.

sections, the number of sections in each district varying from 9 to 14, with a total of 77 sections in all. Sections are laid out to include about 33 miles of road, wherever possible. A Highway Repair Foreman is in charge of each section with a gang of about 14 laborers, chauffeurs, etc.

All operations of Highway Repair Foremen are directly supervised by Highway Maintenance Foremen, one Highway Maintenance Foreman supervising an average of three Highway Repair Foremen. General planning, supervision, and coordination of all maintenance operations within each district is done by the District Maintenance Engineer and his Assistants under the general supervision of the District Highway Engineer.

● SNOW blower in operation in the Yarmouth area. Strategic dispersal of men and equipment permits minimum dead-head mileage and facilitates getting on job quickly.

Sections are laid out and Highway Repair Foreman's headquarters are established as strategically as possible so that dead-head mileage is kept at a minimum and so that a minimum of time is lost in combating sudden storms. Two heavy trucks and two light trucks, (state-owned), all equipped with plows are normally assigned to each section. This equipment is used from the start of each storm, and is augmented by hired equipment as the severity or duration of the storm requires.

Speed Is Important

The importance of speed in combating storms, especially in and surrounding metropolitan areas, particularly those storms starting in the early morning and mid-afternoon hours is apparent. Plowing and sanding operations during the periods of traffic peaks are inefficient, and often impossible. If possible our foremen must "beat the traffic" in order to minimize tie-ups and accidents. The dispersal of men and equipment to strategically planned sections as described above has helped accomplish this. Dispersal of sand and chloride stockpiles is equally important.

The present organization for winter maintenance operations consists of about 1000 regular men in various labor classifications and a reserve of nearly as many part-time emergency workers who are on our lists for call when our regular forces must be augmented or relieved.

Department owned equipment used on snow and ice operations includes the following:

Heavy Trucks (5 tons and over)	**132**
Light Trucks	**260**
Graders	**14**
Plows	**1000**
Trailer-type Sandspreaders	**200**
Chloride Spreaders	**65**
Heavy Loaders	**24**

In addition to these, the Department may rent up to 1000 trucks at one time or another during the winter season, as well as mechanical loaders of various types and other miscellaneous equipment. About 500,000 tons of sand and 35,000 tons of chlorides are used annually for ice control.

As a part of long range planning, the Department is engaged in a program for the construction of Highway Repair Foreman's Garages. These garages, measuring approximately 40 feet by 100 feet, provide an office for the foreman; a locker room for the men; a storage area for one of our smaller trucks; and four stalls 40 feet deep, each of which will take the largest of our snow units without removing plow or scraper blades or wings. The garages are heated and equipped with toilet facilities.

By constructing our own garages we are able to locate them strategically within the foremen's sections and the dead-head haul in most cases is kept very low. The average garage site includes about three acres of land which is fenced. In this area the foreman may consolidate the storage of all of his equipment and materials. The garage serves as a meeting-place for the men and a communications center for the sections. The warm-up period for heavy equipment is greatly reduced by heated storage, and valuable time is saved at the beginning of a storm. Under the former policy of the Department we were obliged to rent garages. In a great many cases the foremen were forced to store their materials and equipment in quarters which were far from ideal either in location or in utility.

Auxiliary Power Units

Our two-way radio system of communication, which has been operative for several years, is also the result of long range planning. The recent installation of auxiliary power has made it possible to keep the system in operation during severe snow and sleet storms which would have had a crippling effect when it was necessary to depend on transmission lines. The benefit of this improvement has greatly increased the efficiency of our winter operations.

Annual preparation for winter maintenance operations actually starts at the end of the previous winter season. All four-wheel driven trucks, sandspreaders, plows and other snow and ice equipment must be inspected and overhauled or repaired before the return of winter. For this purpose the Department of Public Works has recently constructed a large Maintenance and Traffic Depot, strategically located at the intersection of routes 9 and 128 in Wellesley. It is arranged for the Districts to ship all mobile and movable equipment from the Districts to the Depot on a schedule so as to prevent congestion. Large plows and other equipment which cannot be transported in truck bodies are handled on low bed trailers based at the Depot. All repaired equipment is returned to the

Districts as soon as possible after the repairs have been completed.

Snow fence is removed and stored and drainage and curbing markers are removed for repairs or replacement. Distinctive colors are used on the markers to indicate the purpose.

Sand is removed from the surface and shoulders, and culverts and drainage structures are cleaned as soon as weather conditions permit. Mechanical sweepers and loaders are used as far as possible on pavement and shoulders, and catch basins are cleaned largely by mechanical means.

Ditches and open waterways are checked and cleared. Drainage which has proven unsatisfactory or inadequate is inspected and improved or replaced if possible. At critical points shoulders are widened and slopes are flattened to provide storage space for snow and to reduce encroachment by water from melting snow.

Prior to the winter months, sand stockpiles are cleaned up and replenished. Chloride is added to prevent freezing and the piles are covered with a waterproof paper. New locations for sand stockpiles and snow fence are established to service new or reconstructed highways. Areas rented for stockpiles are reviewed annually, and rentals extended or discontinued as the need is indicated. Recommendations for new rentals are submitted to provide facilities for new highways or alterations.

Requisitions for sand and chlorides are submitted so that processing may start soon after July 1, (the beginning of the fiscal year). The deadline is October 15. The use of sand bins is being discontinued as existing bins have generally been declared unsafe from age. Open sided sheds and stockpiles are used in their place. The speed of modern mechanical means of loading is such that the cost of erection and maintenance of bins is hardly justifiable.

Chlorides are being purchased delivered to storage sites, and bulk shipments are being obtained in increasing amounts. Delivery is being made by both truck and rail. Rail delivery presents the problem of locations and facilities for unloading cars. Vendors are experiencing some difficulty in obtaining contractors to unload cars and transfer the chlorides to storage sites, but it is expected that these problems will be resolved as vendors attain more experience in this relatively new procedure.

Chloride Advantages

The delivery of chlorides to storage sites has eliminated a personnel and equipment problem which has been troublesome. Materials had to be unloaded in a short time and on short notice. The operation required either the interruption of our normal seasonal operations or making arrangements for the work to be done by contract with a trucker.

The cost of chlorides in bulk is, of course, less than the cost of bagged chlorides, and even though a small part of the savings is probably lost in the use, because control of quantity and elimination of waste is more difficult with the bulk than with the bagged product, there is no question that the use of bulk chlorides is generally more economical than their use in bags. The handling is almost entirely mechanical, so that the chances of personnel accident or injury are reduced, and there is no problem of disposal of containers.

No elaborate arrangements have been made for the storage of bulk chlorides and each district has devised its own method. Outdoor storage is the general rule. A wall, usually of bagged chloride, is built several bags high on three sides of a rectangle, and the bulk chloride is dumped inside the rectangle through the open end. The pile is shaped and covered with waterproof paper. Withdrawal is made from the open end of the rectangle.

Autumn Activities

In the early fall, pavements are inspected for condition and necessary patching is done. Later all drainage and curbing markers are installed and drainage outlets are reinspected and cleared.

On or before October 15 each District Highway Engineer submits a list of Department owned equipment with recommended assignment by location to the work of snow and ice control as well as a similar list of proposed hired equipment which will supplement our own. Proposed rental rates of hired equipment are also submitted for approval; such equipment is inspected and state-owned plowing equipment is installed whenever the truck owner is unable to furnish the unit.

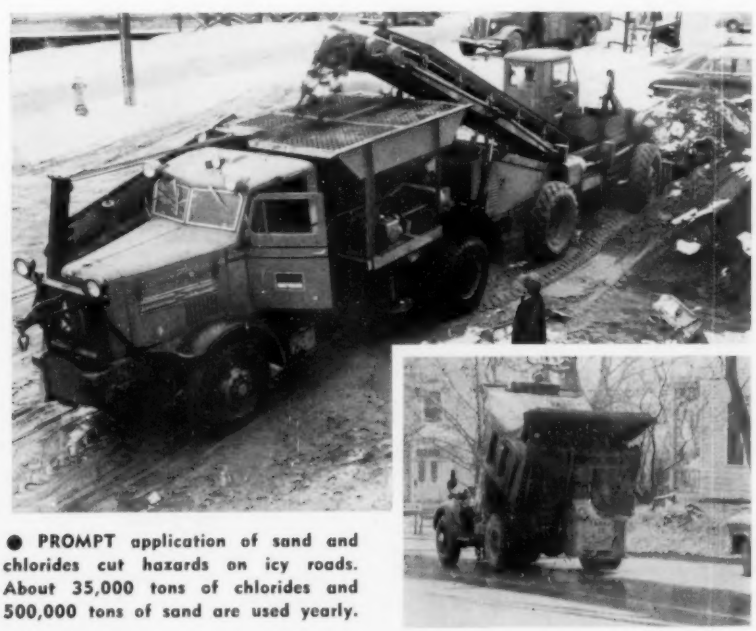
Lists of emergency personnel to supplement Department personnel in prolonged plowing and sanding operations are prepared.

Snow schools are held at various points through the state for "dry run" instruction in the operation of the various types of snow and ice equipment. As far as possible equipment is assigned for exclusive operation by certain personnel as an incentive for the operator to exercise care in the operation and maintenance of the equipment.

At the first signs of snow or icing, patrols are established for the treatment of hazardous locations. These patrols are maintained throughout the snow and ice season as conditions require.

From the beginning of the winter

(*Continued on page* 106)



● PROMPT application of sand and chlorides cut hazards on icy roads. About 35,000 tons of chlorides and 500,000 tons of sand are used yearly.

Plowing, Ice Control and Roadside Clearing

KEEP TRAFFIC MOVING

C. ARTHUR ELLIOTT

Greene County Engineer

Jefferson, Iowa

ALL WINTERS in north central Iowa, when it comes to snow removal, are compared with the terrible storms of January and February, 1936. During a 30-day period ending on February 19th, 1936, the temperature never rose above zero day or night. During that below zero period we had nearly 3 feet of snow and winds that effectively blocked our efforts to keep any section of road open more than 24 hours at a time. My diary of that period records several days of raging blizzards with the temperature at 20° below zero—yet the rule is that it usually warms up to snow.

In 1936, Greene County had one truck snow plow, three small 18-inch high motor patrol plows and 3 tractor plows. Two thirds or more of our road mileage was below what we now term the snow line. About that time, the people were getting used to operating their automobiles 12 months of the year, bob sleds and horses were getting scarce and people were expecting roads to be clear at least a majority of the time during the winter.

Greene County did have some 150,000 lineal feet of 4-foot snow fence and that was in place when the winter of '36 hit. However, as anyone familiar with snow removal realizes, the first good snow and wind filled the snow fence to capacity and succeeding storms simply blew on over the fence. Like the other counties in this area, Greene County did what little it could with the equipment it had and the road conditions as they were. After the first good snow and accompanying wind, our snow fences were useless. After the first period of drifting, our 18-inch patrol plows were too low and the power behind them insufficient, and they were parked. Our one truck plow, an FWD with a Frink V-plow, performed miracles and we tried to save it for childbirths, deaths and other extreme emergencies. One problem was to keep the necessary repair parts on hand, as the low temperatures and severe overloads placed on the equipment resulted in numerous breakdowns. Our last line of defense, or maybe I should say offense, was our three tractor plows. As everyone realizes a tractor plow is not the most efficient piece of snow plowing equipment. They are slow, awkward and lack tractive ability on slippery surfaces. However, with the help of the farmers, WPA crews and our own county crews using scoop shovels ahead of the tractors, we did manage to get feed to stock and doctors to some patients part of the time. Surely no one in this area wishes to duplicate that 1936 season.

Now 20 years later, Greene County presents a far different picture. Over 600 miles of our 947 miles of secondary roads have been graded above snow-line. We now own 10 of the largest type diesel motor patrols equipped with snow plows and snow wings. We have a 5-ton Walters Sno-Fighter, four FWD 3-ton trucks and two other 2½-ton trucks, all equipped with Frink or Wausau Vee and one-way plows. These 17 plows together with a D-7 and TD-18 tractor plows, give

● **NOT EVERY YEAR brings heavy snow conditions like this, but Greene County has the organization and modern equipment to handle such severe snow problems.**

Greene County a plow for each of her 16 townships and three standbys for emergencies. The two tractor plows haven't been used in the past five years and are only a last ditch defense.

Along with these plows we have approximately 200,000 lineal feet of 4-foot wood snow fence which is erected each October at our worst locations. Some five years ago we stopped buying the usual car-load of new fence to replace normal wear and tear, and adopted the following philosophy: Assuming our present supply would be depreciated and worn out at the end of 12 years, we would have in turn during that 12 year period constructed another 350 miles or more of our grades above snow line. This construction would leave us less than 20 percent of our entire road system subject to normal snow hazards. With less than 200 miles of roads to worry us, we felt our present equipment would be adequate to give reasonable service without benefit of a great amount of fence.

At the end of the first 5 years of this 12-year period it looks like the last of our fences would outlive the predicted 12 years and we are continuing to erect all suitable fence each fall. Our snow fence is erected on the north and west sides of the highways on the assumption of a 15 to 1 slope for drifting snow and we find that ratio to be quite accurate. We have four trucks equipped with hydraulic drivers for setting the steel posts, and some three weeks are spent each fall in placing our fence, using four crews. If each farmer would leave 15 or 20 rows of corn stubble along the bad areas each fall, we could forget the fence.

Our 16 townships are divided into 16 snow routes of approximately 60 miles each. The trucks are assigned the areas farthest from the storage garages, with the motor patrols taking the routes closer in. After plowing a one way road through their complete route, the trucks go back to their garages and the motor patrols, with snow wings, complete the widening and winging back operation. Should winds drift the roads shut again we may have trucks and patrols on the same route if conditions require it. Successive snows and high winds at times force us to our crawler tractors and we have occasionally used bulldozers to remove frozen crusts ahead of our largest units.

The past three winters have been mild in this section of the state as far as snow is concerned but we hope we have not become rusty or out of practice. The cycle will eventually return and we may again experience the snows of '36.

Ice Control

Invariably, a winter without normal snowfall is a winter with above normal icing conditions. That statement has been pretty much an axiom the past few winters in north central Iowa. With increased mileages of hard surfaced roads, we are more and more conscious of the hazards of slick surfaces. Our efforts have in the past, been pretty much confined to manual manipulation of abrasives for ice control. However, we recently purchased 5 endgate spreaders which are power driven from a contact wheel with the two rear truck wheels. With these spreaders we are able to give excellent service when freezing rain coats our roads. These spreaders are set to spread the sand in a herring bone pattern and with reversible clutches we are able to back up the steeper hills, spreading as we go. Early each fall, sand is trucked into each of our maintenance yards and mixed in layers with calcium chloride. The calcium chloride is effective at nearly all temperatures and we find it very efficient. The only exception to the use of chlorides in our sanding materials, is in applications to our new portland cement pavements. We try to keep all chlorides from these pavements for at least two years even though an air entraining agent was added to the paving mix at time of construction.

Snow control consists of doing a lot of things.

Weeds and Brush

A great contributing factor to our snow removal effort in Greene County, has resulted from our weed and brush eradication program which has been going on for some 25 years or more. In 1936, Greene County was using approximately a car load of sodium chlorate a year on roadside spraying for weed and brush control. This practice was continued until 2,4-D was developed and the Iowa Weed Law enacted. We now have a full-time weed commissioner and use both 2,4-D and 2,4,5-T. With four truck-mounted 500-gallon sprayers, we cover our entire road system of 947 miles at least once each season. We spray, with a solution of 2,4-D and 2,4,5-T, from shoulder line to fence line by means of cantilevered spray bars suspended from the truck frames. The balance of the season is spent in spot spraying the stubborn growth areas not killed on the first round. This program has completely eradicated brush from Greene Counties secondary roads and consequently eliminated the blocking of our roads by snow drifts caused from vegetative growth.

Another contributing factor to clean roadsides, and consequent scarcity of snow drifts, has been the seeding of all our new grades with brome and rye grasses immediately following construction. We accomplish this seeding by means of a home made seeder, consisting of a 2½-hp gasoline motor driving an endgate-type seeder all mounted on the side of a truck dump box. As the truck is driven along parallel with the shoulder of the road, the seed is thrown at right angles to the truck into the ditch and on the shoulders and back slopes. We successfully sow 90-foot rights-of-way in this manner, and consider the program a preventive step in weed and brush control. Our seeding cost, including brome and rye seed, was under ten dollars per mile this past season.

The policy in Greene County has been to provide, as near as practicable, uniform highway facilities to all farm homes. This service is given, as far as snow removal is concerned, regardless of traffic densities or geographical location. We feel that an open road is a necessity even though there be only three vehicles: the school bus, the cream truck and the mail man using the highway. The agricultural effort depends upon the accessibility of markets, schools and society, regardless of the individual contribution; and efficient and prompt snow removal is certainly a necessary part of this philosophy.

SEWER ODORS

GEORGE W. REID,
Associate Professor of Civil Engineering,
University of Oklahoma,

CHARLES IMEL,
Student, College of Engineering,
University of Oklahoma,

W. W. BAKER,
City Engineer, Oklahoma City

● **OBSERVING operation of the pilot plant, which is designed to test rate of decomposition of deposits. Transparent plastic cover over flow channels permits study.**

THERE ARE FEW problems more trying to the city engineer than the odors associated with the city sewerage system. Sewer odors result from conditions in the sewer that permit anaerobic bacterial, and possibly fungal, decomposition of the free floating and deposited organic materials and subsequent dispersal of the gaseous production to the surface. The production of odorous compounds in partially full sewers with proper ventilation is generally believed to be restricted to submerged deposits of organic silts, greases, and slimes. Sewers flowing full or partially full, but poorly ventilated, may produce odors. There is some question as to whether or not the grease and slimes merely form a matrix for the silts or are actually involved in the production of odors. The nitrogenous compounds decompose first, followed by organic sulfur and the sulfates. The principal odorous compounds produced are cadaverine, indole, skatal, mercaptans and hydrogen sulfide.

Available literature indicates that engineers and researchers generally have given major attention to those odors associated with the reduction of organic sulfur compounds and sulfates resulting in the formation of hydrogen sulfide, commonly called sewer gas. The rate of production of sulfides and consequent odor production is increased by temperature and biochemical oxygen demand; apparently not affected by normal sulfate concentration increase; but increased by sulfate-containing trade wastes. Though sulfides are produced in a pH range from 6-9, increases in pH reduce the proportion of hydrogen sulfide. For example at pH 6.0, 83 percent of the dissolved sulfide is hydrogen sulfide, at pH 7.0, 33 percent; at pH 8.0, only 5 percent. It should also be noted that bacteria of the genus Thiobacillus can remove rapidly, by oxidation, hydrogen sulfide from the sewer atmosphere to form sulfuric acid. The lower Redox potential required for sulfide production accounts for the fact that, with ordinary velocities, the flowing sewage may not produce hydrogen sulfide in the time required for the sewage to reach the plant.

Greater attention to sulfides rather than to other odorous compounds is in all probability due to the corrosiveness of sulfides. Odors from the reduction of proteins producing the amines or ptomaines (cadaverine, indole, and skatal) will develop from the deposits and from the flowing sewage as soon as it becomes septic; and sewers may have odors because of the higher Redox potential prior to hydrogen sulfide development, even though hydrogen sulfide is not present.

Odor-Producing Conditions

The condition most likely to produce odors from a sewer involves sewers flowing full, or nearly full on flat grades. There is opportunity for odor production from deposits as well as from flowing sewage; also the likelihood of the conversion of hydrogen sulfide to sulfuric acid and the liberation of gas at manholes. It, therefore, becomes important in odor control to locate the points in a sewerage system at which these conditions are most likely to occur. In a recent study for the City Engineer's office, Oklahoma City, a technique was developed that compared tributary areas served and coincident sewer capacity. A dimensionless constant $(A_c)/d^2$ was developed which indicated where sewer overloadings are most likely to occur. The constant was developed as follows:

(1) Sewer Capacities:
$Q = AV$, let V remain constant (assume minimum flow); then Q is proportional to A and consequently is proportional to d^2.

(2) Quantity of sewage:
Assuming an average per capita flow and an average residential population density, then Q from the tributary area is proportional to A_c in acres.

(3) Relating (2) to (1) to determine the ratio of quantity to capacity:
Then $\frac{A_c}{d^2}$ = the relative concentration of sewage.

Oklahoma City studies indicated a high correlation between these determined points and odor complaints.

Properly designed sewers, with adequate flushing velocities and periodic cleaning, go a long way toward the prevention of odors; but unfortunately, manual cleaning is often neglected and many of our sewer systems are designed with inadequate velocities.

There are numerous methods of controlling odor in sewers already in place and many of them have been studied in considerable detail. In general they include: (1) Methods directed at the removal of the slimes, grease, and silt deposits, such as chemical cleaning with acid,

caustics or chlorinated benzenes, or the addition of massive dosages of specific biological cultures designed to utilize grease in the sewer environment. The authors believe that it is possible to improve sewer environment as a result of improved flow conditions arising from grease and deposit removal. The question then is simply one of whether or not specific cultures designed to utilize grease in a specific environment can be produced, inactivated, and regenerated in this environment. (2) Methods directed at the oxidation of reduced compounds (sulfides for example) or increases in the oxidation-reduction potential of the sewage, as by aeration, chlorination, or the use of sodium nitrate, sodium chlorate and ozone. (3) Methods for precipitating sulfides, including iron salts, zinc, and copper. (4) Increases in pH, to reduce percentages of radical gases by the use of lime. (5) Reduction of biochemical oxygen demand and sulfate concentration of sewage by detention or treatment at the source. (6) The use of specifically toxic substances to halt bacterial action, as chlorination, zinc, copper, chloropropane, trichlorophenol, pentachlorophenate and chrome.

Odor Control Methods

There are four methods of odor control that deserve special mention. These are: mechanical cleaning; use of a biological additive; use of chloroben; and use of alkaline chlorination, which is an economical method of use of chlorine. More recently, considerable interest has been evidenced by engineers in the creation of more favorable conditions by massive inoculation with a bacterial culture that will utilize the deposited organic material and grease as food and thus clear the sewer walls of decomposible solids. Inoculation merely accelerates the eventual determinative growth.

Research studies in sewers and in a pilot plant set up at the University of Oklahoma have been under way on this method of control. In these studies a preserved culture of specific groups of facultative and aerobic bacteria, as well as fungal groups, were introduced into the sewer while in a state of high activity. The objective, as claimed by the manufacturer, was to increase suddenly the rate of decomposition of deposits, causing these to slough off, thus improving the flow conditions and providing fresher sewage with a higher O-R potential. (Bionetic, a product of Reliance Chemicals Corp., was used).

It should be noted that these products are so new that adequate techniques of evaluating the results and controlling the additions have not been developed. This, consequently, becomes a part of the problem. The tests initially chosen to reflect the environmental conditions of the sewer were primarily to note changes in grease, biochemical oxygen demand, bacterial population and solids as these changes were the basis of the claim for the successful use of the product. Odor determinations were also made during the tests.

It was felt, since both nitrogenous and sulfur compounds were implicated in odor production, that conventional tests depicting environmental conditions were superior to a search for reduced products. The tests showed the addition of a biological additive to have an immediate effect in increased values for grease content, settleable solids and bacterial count; and to result in a more stable pH and perhaps an increase in biochemical oxygen demand.

The immediate effect lasted only about 48 hours, after which the values of biochemical oxygen demand, and settleable solids decreased to below normal, remaining so for about three weeks. The bacterial plate count also decreased, but averaged above normal. The pH was little affected.

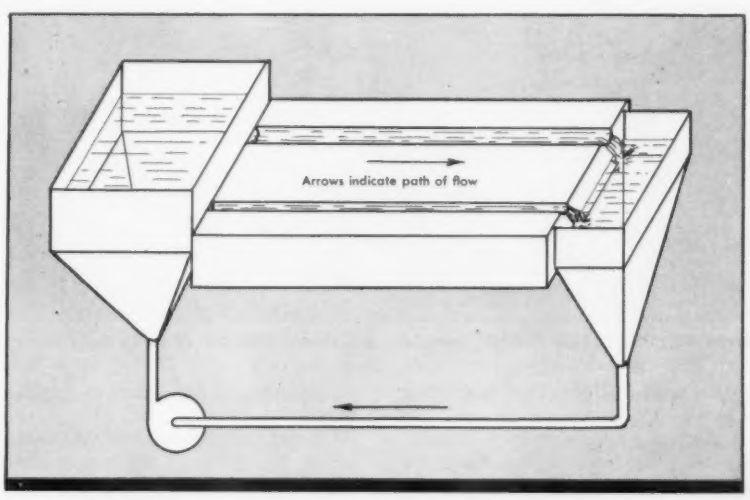
The results indicated that an application of five small doses of biological additives of about two pounds each applied in the laterals, with a larger dose of about five pounds into the main outfall line, above the laterals, is effective for the type and quantity of sewage studied. The effect of this type of application should last three to four weeks. The results indicate that conventional biochemical oxygen demand and settleable solids may be used to determine the end point of an application.

Continuing Studies

At the present time laboratory studies are under way on a small model section of sewer to determine if slimes and grease can be removed by biological additives or by other chemicals, including alkaline chlorination. Construction is such that we can readily observe performance.

There exists a question as to whether or not redox readings indicate odor control. Redox readings to test for odor should be useful only if the flowing portion is providing sulfides or other chemical reducents; generally this is unlikely but on the flow portion of study in the laboratory, note will be taken of redox alterations by biological additives, chloroben, and alkaline Cl_2, as well as correlated sulfide production. The flowing portion can be managed so as to produce sulfides as well as odors of septicity.

Economics of the different methods will be studied and a practical application of the best method will be made on the entire collection system of Oklahoma City. A statistical comparison of the routine odor complaints will be the criteria for final analysis, which should make it possible to account for a variety of odors other than hydrogen sulfide.



● **PILOT PLANT for sewer odor studies. As set up at the University of Oklahoma, pipe diameters are 1½" and ¾". No air or sunlight can reach the flowing sewage.**

MOVE SIGNS OVERHEAD ON

LEON W. CORDER,

Traffic Engineer,

Missouri State Highway Dept.

THE ERECTION of an ever increasing number of roadside and street advertising signs has created a great deal of distraction for the vehicle driver. Also, as traffic has increased, the old two-lane roadways have gradually been replaced by multilane pavements with the result that often times the vehicle drivers in the center lanes find themselves from 20 to 30 ft. away from the right curb. These several conditions which seem to be prevailing in more and more instances, serve to mitigate against shoulder signing.

Likewise, where traffic volume is heavy, and most of the lane spaces on a multi-lane pavement are filled, drivers on the inside lanes quite frequently are unable to see shoulder signing, due to the presence of tall commercial vehicles, or for other reasons involving background. In addition, the necessity for maintaining keen observance of nearby moving vehicles may also prevent the driver from adequate use of any shoulder signing that is in place. For these reasons, it is not always possible for the driver to work his way into the proper lane if he wishes to take advantage of a route turn-off or street intersection.

About the only solution in such cases seems to be for the signing to be moved overhead. Where individual lane control has been provided in the past, it was necessary that the traffic signals be moved overhead. Much the same may be said in support of the change in highway signing. In Missouri, the State Highway Department has not, as yet, erected a great many overhead signs. Those few in place have been located on busy multilane highways near junctions or interchanges. These have not been so related to the designation of individual street turn-off points as they have with Federal or State route directions. This is particularly true in Missouri, because normally the State Highway operation of highways does not extend into the more congested areas of larger municipalities.

One of the more important installations of overhead signing in Missouri is located at a clover-leaf interchange about one mile south of Kirkwood, in the overall St. Louis metropolitan area. At this location a number of Federal routes are involved. Regular U.S. 50, U.S. 61 and U.S. 66, as well as By-Pass U.S. 50 and By-Pass U.S. 67 run through this intersection. Vehicular speeds in approaching this area from the rural areas to the west and south are somewhat high. Traffic from the north and from the east, having passed through well built up areas does not present quite as much of a problem. However, the eastbound and northbound traffic would quite frequently over-run this intersection, or at least make use of the wrong ramps in re-orienting itself. For that reason, it was decided to install overhead route marking at this point.

Inasmuch as right turning traffic is supposed to turn off to the right just before reaching the Interchange, and also because left turning traffic must make two right turns just beyond the Interchange, it was decided that a set of overhead signs should be provided for each of these turn-offs. Thus, from all four approaches, two sets of overhead signs may be seen. Actually, the two sets of signs are far enough

● **WITH OVERHEAD SIGNS, motorists get ample warning of turns to be made as they approach this cloverleaf interchange.**

apart so there is no interference.

All signing is erected on two lines of ⅜-in. steel cable, with a minimum vertical clearance of 14½ feet. The cables are supported by creosoted poles which are anchored in the islands around the Interchange. The signs themselves are 36 ins. deep by 42 ins. wide and are made up of 0.102 gauge aluminum, in the 6061-T6 alloys. They are finished in a dull black, with white letters, which are reflectorized with clear plastic buttons.

These signs list the route numerals and the cardinal directions, with any necessary directional arrows, for the regular routes. For the "City" or "By-Pass" routes, in addition to the route numerals and the cardinal direction indications, the words "City" or "By-Pass" are added on the top part of the sign. For the regular routes, 12-in. white numerals are used, while the letters giving the cardinal directions are 6 ins. in height. For the "City" or "By-Pass" routes the route numerals are 10 ins. in height, while all

types of signing placed in an overhead position. The signs were inspected against sunlight, and with sunlight at the observer's back. They were inspected at night, during rainy weather, and at other times when a combination of the above circumstances existed. The results of these tests indicated uniformly that a dark background with white letters provided the best visibility. Since erecting these signs at this particular Interchange, very little difficulty with traffic has been experienced. It is anticipated that in the future, additional installations will be placed.

In explanation of these experiments, and in clarification of signing policy so far as reflective media are concerned, it might be stated that the Missouri State Highway Department makes use of many varieties of reflective materials. Although the overhead signs described above provide a non-reflective dark background, but with the white letters reflectorized, there are many other instances where materials have merit, and as a result, attempts have been made to evaluate each, and to make use of each reflective media under the most advantageous conditions. No attempt has ever been made to standardize on any one type of reflective material, for it has been felt that only through the judicious use of all available materials can the most effective signing be produced.

Previous to the installation in question, a few overhead units were placed in downtown St. Louis making use of 24 x 42-in. signs, which provided a white background with black letters. Although a few of these are still in place in the city, it has never been felt that they provided the striking contrast for good visibility that is provided by the dark background and white letters. In all cases, cables were used to support such signing. The numerals for these signs have been 12-in. in the case of the regular routes, and 10-in. for the "City" and "By-Pass" routes. The letter-

● **REFLECTORIZED LETTERS show route numbers and cardinal directions and also designate "City" and "By-Pass" routes.**

lettering for both the cardinal directions and the "City" or "By-Pass" route designations, is in 6 in. letters.

A number of experiments were conducted, making use of different

signs with background reflectivity of white, yellow or red are used. It has been felt in the Missouri Department that most of the various available types of sign reflective

ing indicating "City" or "By-Pass" is 2½ ins. in height.

It is anticipated that a great number of overhead signs will need to be erected on new Urban Express-

ways now being constructed in St. Louis, Kansas City and other large centers of population. The creosote post and cable combination while sturdy, is not particularly attractive. For that reason it is anticipated that sign trusses will be used on these urban developments. Information is being accumulated and experiments are being conducted with reference to the various types of trusses which are available.

The State of Washington has made use of some very interesting fabricated trusses on the Alaskan Way Viaduct in Seattle. In New York, a different type of truss has been used on East River Drive. The State of California is making very successful use of still a third type of fabricated truss on many of its freeways. The Virginia Department of Highways, the Delaware State Highway Department, the Michigan State Highway Department and the Florida State Road Department, to mention only a few, are also using various types of overhead sign trusses. While most of these trusses are constructed of steel, they are available in aluminum. The sign truss presents a much more attractive appearance than the creosote pole-steel cable combination.

A very interesting development in connection with overhead signing was described in the November 1955, issue of *Traffic Engineering*, by G. R. Cysewski, who was then a District Traffic Engineer for the Washington State Highway Commission. Mr. Cysewski has made use of a type of overhead sign background which resembles a permanently placed Venetian blind. Due to the angled position of the louvers, the sign as viewed from below on the front side appears to be completely dark except for the lettering. However, when viewed from below on the reverse side, it is possible to look through the louvers and see open sky. Since all sign trusses are rated on their capacity to support certain square footages of sign surface (due to wind pressure), this louvered sign appears to have very distinct advantages because of its openings which permit the passage of air. Although other overhead sign frames have made use of woven mesh wire for this same reason, they did not have the advantage presented by the louvered sign, which is the provision of a dark background.

The only objection which we have heard expressed in relation to overhead signing and overhead traffic signals, has to do with the outside built-in visors with which many motor vehicles are provided. When this visor is in place there is no doubt about the difficulty experienced by the driver in seeing any sort of overhead installation. However, due to the fact that it does not seem possible to provide adequate indication for vehicles on multi-lane pavements without going overhead, the problem caused by the built-on outside visor will have to be met squarely by motor vehicle manufacturers. In a circumstance such as this, where a piece of motor vehicle equipment interferes so markedly with a traffic control safety feature, we are inclined to quote from one of the currently popular songs, "Something's Gotta Give".

WATER FOR A RESORT ISLAND

TOM W. JUSTICE

R. L. Kenan & Associates
Consulting Engineers
Pensacola, Fla.

"HELLO, BARNEY . . . You better bring me about three extra jugs. We're expecting guests." The customer was talking about water—not liquid courage. As late as 1950, potable water was being delivered in jugs to Santa Rosa Island, in Pensacola Bay.

A special act of the 1947 Florida State Legislature created the Santa Rosa Island Authority. The objective of the Authority is the development of the 22 miles of Santa Rosa Island owned by Escambia County. The Island stretches from the entrance to Pensacola Bay to Fort Walton, a distance of about 50 miles. The average width of the Island is about 1,400 feet and it is separated from the mainland by Santa Rosa Sound, which is approximately a mile wide. The wide smooth beaches have been called the whitest in the world.

● **BRACKETS on side of the Pensacola Bay bridge support 10-in. cast iron pipe.**

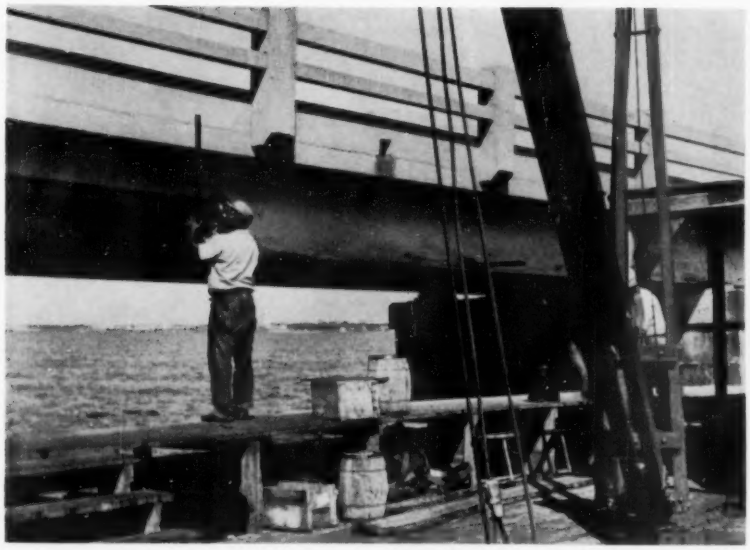
The Santa Rosa Island Authority set out to develop the Island as a resort center but found that the greatest hindrance to the growth was an inadequate water supply.

In 1950, there was one well which furnished water for fire protection, but the water was not fit for human consumption. It was imperative that good water be supplied to the Island before any growth could be expected. To reach the Island from Pensacola, one must cross Pensacola Bay; a peninsula called Town Point; then finally Santa Rosa Sound. The Santa Rosa Island Authority was confronted with the problem of obtaining a limited supply of water with the small amount of money available.

Investigations showed that to assure the Island of potable water, with the funds available, it would have to come from Town Point.

In 1951, for a temporary supply, two shallow wells were drilled on the peninsula and produced water which was potable but unsatisfactory aesthetically. A distribution system was installed on the Island and pipe laid on the curb of the bridge connecting the Island to Town Point. The development of the island was rapid after the completion of the water system. There were 8 residences and 40 rental units on the island in 1951. Today, there are 160 residences and 250 rental units with more going up.

An elevated storage tank of 100,000 gallons capacity was erected in



● **WORKING from a barge, 18-ft. length of pipe is hung on brackets under bridge.**

1952 to replace an old 40,000-gallon tank which was in bad condition.

The history of wells drilled on the mainland east of the development was studied carefully. Based upon the performance of those wells, it was felt that by going to a depth of about 1,300 feet, potable water might be obtained from the same lime-rock strata that wells on the mainland had tapped.

An agreement was signed in 1954 with a contractor to drill a test hole east of the development on the Island. The contractor agreed to drill the test hole to the lime-rock at his expense. The Santa Rosa Island Authority had an option to buy the well if suitable water in sufficient quantity was produced. The hole was dug to a depth of about 1,450 feet. No potable water was encountered and the test was abandoned.

The Authority was faced with the alternative of enlarging the shallow well field on the peninsula and building treatment facilities, or obtaining water from the mainland at Pensacola.

It was only a matter of time before the area in which the shallow wells were located would itself be developed. As it developed, the danger of contaminating the wells would increase. Also, each new establishment would sink a well for their needs, thereby lowering the water table.

Therefore, negotiations were started with the City of Pensacola to buy water from it. Pensacola is blessed with deep wells that produce in excess of 2,000 gallons per minute per well of fine water. The City agreed to sell water to the Authority for 7 cents per 1,000 gallons, plus a standby charge, delivering it to the approximate city limits.

To deliver the water to the island required a main across Pensacola Bay, a distance of three miles, and a connection to the existing main on the peninsula.

Mechanical joint pipe, 10 ins. in diameter, was attached to the sides of the bridge beams with brackets. Near the mid-point of the bridge is located a draw span. Here the pipe had to be laid on the bay bottom to avoid interference with intercoastal waterway traffic. Flexible joint pipe was used with horizontal lateral deflection in each joint to allow for settlement. Expansion joints were placed in the main attached to the bridge at 650 feet intervals. A meter and quantity control valve were installed at the point of delivery by the City Water Department of Pensacola.

On the island ten miles away, a 250,000-gallon ground storage reservoir and pumping station were installed, with a booster pump to lift the water to the elevated tank. City main pressure will deliver 400 gallons per minute to the ground storage reservoir. It is believed that this 400 gpm will supply 2½ miles of the island when fully developed. When the demand exceeds 400 gallons per minute, booster stations will be installed as they are needed. Calculations show that approximately 1,000 gallons per minute can be pumped through the 10-in. and 8-in. mains without creating excessive friction head.

It is felt that future expansions for supply must come from the east. Based upon performance of wells located on the peninsula about 15 miles east of the present development, it is believed that adequate water can be delivered to the Island as the growth eastward demands it.

Total cost of the ground storage reservoir; pumping station; 27,000 feet of 10-in. pipe, 16,000 feet of which was attached to the bridge, and 300 feet was laid on the Bay bottom; was approximately $205,000.

● **LOOKING at the completed job. Town Point is in the distance. Bridge is three miles long. At draw span near center, the 10-inch pipe was laid in the bay bottom.**

We have Standardized on
SOIL-CEMENT STREETS

E. W. TALLEY

Street Commissioner

Union City, Tennessee

THE BENEFITS of a 4-year street paving program, begun in 1952, are already accruing to Union City, Tennessee. In this program particular attention has been paid to the durability and maintenance requirements of paving materials. By standardizing on soil-cement pavement, the city has been getting a trouble-free pavement at a cost of only about 60 cents per sq. yd. for the base, plus about 30 cents for surfacing.

As so often happens in small cities, officials had gone along for many years with conventional street paving and maintenance practices until they realized that a very large share of the street budget was being spent to keep patched, bumpy streets passable. Fortunately for Union City, a careful study of street conditions and paving costs was made before any action was taken.

My predecessor as street commissioner, W. D. Frizzell, initiated our soil-cement street paving program after studying performance and construction of soil-cement in nearby Madison County, Tennessee, and Jackson, Mississippi. He also noted some soil-cement that had been built around the Union City courthouse in 1941. At the Tennessee Highway Conference last year he stated about this pavement: "Can any other city represented here show me a 13-year service record with a total maintenance cost of $1.25. The city built this five blocks of soil-cement around the courthouse before the time of our modern soil-cement equipment. The project was constructed with local city labor and farm equipment. Despite the crude methods by which the street was built, it now has gone through 13 years of service as one of Union City's most heavily traveled streets with one single patch about 18 ins. in diameter which was applied to the surface in December, 1953, at a cost of $1.25. The soil-cement base has required no maintenance."

Since Union City's soil-cement program began in 1952, we have built from 25,000 to 35,000 sq. yd. of soil-cement streets per year. I have continued the program, begun by Mr. Frizzell, and we expect to complete all the streets in our paving plan this year, and also others that were not planned originally.

In addition to their low cost, soil-cement streets have proved to be real maintenance savers for us. It has been our experience so far that soil-cement requires no patching.

A breakdown of the costs of some of our soil-cement streets built last year is shown in Table 1.

The equipment we use consists of one Seaman Pulvi-Mixer for mixing; a Smith cement spreader; two water trucks; two graders; a sheepsfoot, steel-wheel and rubber-tire roller; and the usual small assortment of trucks and tractors.

We require curb and gutter on all streets to be paved. This makes construction much easier since the curb and gutter provide definite control lines for the grade. Construction is quite simple and our city crews have had no difficulty with it. The amount of cement needed is predetermined by simple laboratory tests.

At this point I would like to commend our entire city crew for the pride they have taken in putting down soil-cement streets. I am ably assisted in supervision by Tom Cloys, our Supervisor of Public Works, and Ernest Craig, Street Foreman.

After the subgrade has been checked for wet areas that may cause difficulty during final rolling, we check the crown and adjust manholes. The street is then scarified to about 5½ ins. in depth and pre-wet with a water truck. The addition of water at this time reduces the amount needed after the cement has been spread, and increases production. In most cases we scarify and pre-wet the street the day before paving starts.

Then our routine of soil-cement work follows with spreading the proper amount of cement, mixing to a depth of 6 in. with enough water for proper compaction, and compacting the mixture.

We believe that the base is the most important part of a street and have found soil-cement to be the answer to good low cost construction.

Table 1—Cost Breakdown for Street Construction

Street	Percent Cement Used	COST PER SQ. YD. Soil-Cement*	Surface**
N. 2nd St.	8	$0.63	$0.28
N. 3rd St.	8	.61	.32
N. 4th St.	8	.60	.27
N. 5th St.	8	.58	.36
N. Clover St.	10	.74	.27
Oak St.	8	.68	.25
Woodlawn St.	8 & 10	.65	.25
Parking Lot	8	.595	...

*Includes bituminous prime.

**Double bituminous surface treatment.

● **MOTOR** grader pulls material away from curb and gutter before mixing begins; no raw soil is left next to the gutter.

● **AFTER** cement has been spread on the surface, it and soil are mixed thoroughly together with Seaman Pulvi-Mixer.

● **WATER** is added to the dry soil-cement mixture to bring it to the most desirable moisture content before compaction.

● **COMPACTION** is provided initially by passes of a sheepsfoot roller. This is continued until roller has "walked out."

● **STEEL** wheel tandem roller is used for final compaction. This gives smooth finish and prepares pavement for surfacing.

● **LIGHT** bituminous coating is applied as last step in construction to seal in moisture and permit hydration of the base.

A MODERN PUBLIC SWIMMING POOL

C. E. WRIGHT

A NEW public swimming pool, the first to be built on Jacksonville, (Fla.) southside, was opened last June. It is the first pool to be built in the city since 1950, when a pool for negroes was constructed. The new pool cost $160,000, exclusive of land, and embodies in its design all that the Jacksonville department has learned in many years of pool operation.

This department, which enjoys an enviable reputation in recreation circles, is supported by a special ad valorem tax of one and a half mills, plus the revenues it takes in. It operates the Gator Bowl football field, now being enlarged to seat more than 42,000, and the Jacksonville Baseball Park, seating 10,000, which was built a little over a year ago at a cost of $535,000. This was financed by issuance of revenue certificates, backed by the department's receipts, including rental paid by the local minor league baseball club. The ball park can also be used for special outdoor events with or without compensation, such as the Western and Folk Music Shows, Starlight Theatre and Easter Sunrise Services conducted by Jacksonville Churches.

The need for a new, modern public swimming pool in South Jacksonville had long been apparent. During the summer season about eighty swim and track meets are held in the city. Last year, the Junior Olympics of the First District AAU brought out 672 contestants. This year the district meet will be held in Jacksonville. The new pool is built to AAU specifications.

Civic clubs and women's organizations of Jacksonville's Southside, assisted by a group of teen-agers, conducted a campaign for a Youth Center. The swimming pool will be an important element in the youth program.

On account of the high water table in Jacksonville, as in most parts of Florida, the new pool is built above ground to facilitate drainage. Locker rooms, a recreation room, showers and rest rooms are all below the pool deck. The bottom of the pool at its deepest point is only 1 ft. below grade. This eliminates the necessity of pumping the waste water.

Entrance to the pool building is by wide turn stairways at the front leading to the reception room which has a large picture window overlooking the pool, enabling the pool manager or supervisor to see what is going on at all times. This could not be done in some of the older pools, where the manager's office is below the pool deck. A cashier in the reception room sells locker tickets, which are 10 cents each, and checks valuables at no cost. Pool users must bring their own suits and towels.

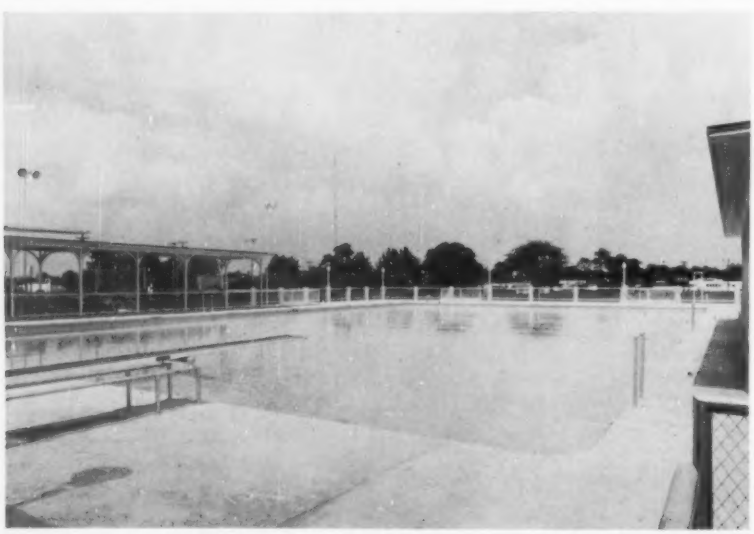
The pool is 75 by 120 ft., ranging in depth from 3 to 11 ft. It is surrounded by a deck 17 ft. wide, part of which can be used for spectator stands during swimming meets. City water, which comes from deep wells, is filtered by a Bowser filtering system and also undergoes the usual chlorination.

From the pool deck, stairways lead to the locker rooms, which surround the tank, men's on one side and women's on the other. There are lockers for 970 persons. Between the two sets of locker rooms is a 42 x 47 ft. recreation room, which can be used for dancing or other amusements. This recreation room is in the two-story headhouse with the reception room above it.

Lighting of the pool is accomplished by 10 L 69 sealed beam floodlights of 1500 watts each, which give good illumination for the night sessions. This pool, and all Jacksonville public pools, are open from 10:00 a.m. to 9:30 p.m. during the summer season which runs from June to September. Weather warm enough for outdoor bathing comes earlier and stays later than these months, but a limit is placed on pool use to avoid competition with the school terms.

From 10:00 to 11:00 each morning during the season, the pool is used for Red Cross life saving and swimming instruction. From 1:00 to 5:30 p. m. and from 6:30 to 9:30 it is open to the public. Life guards certified by the Red Cross are on duty at all times the pool is in use.

The Jacksonville City Recreation Department is operated by a Recreation Board, of which George G. Robinson is executive secretary and Nathan L. Mallison is superintendent of recreation activities. The pool design embodies their suggestions and those of L. C. Hill, department engineer. Plans were prepared by Saxelbye & Powell, Jacksonville Architects.



● **POOL is 75 ft. by 120 ft., surrounded by deck 17 ft. wide. Water is from deep wells, filtered. Because of high ground water, pool is built mostly above ground.**

● DAY-TIME view of the Oak Ridge shopping center, with 65 retail stores and businesses, showing Kerrigan standards.

● PARKING lot at Oak Ridge shopping center, shown here at night, accommodates 2,000 cars and cost over $90,000.

DEVELOPING and LIGHTING A SHOPPING CENTER

RIGHT IN the heart of Oak Ridge, Tennessee, stands the impressive, large, new Shopping Center known as "Downtown", which houses 65 retail stores and businesses in an "L" shaped design. Still growing, a new strip will be added soon to complete a "horseshoe" of buildings.

Tenants include the following: a department store; a five-and-ten; two super markets; three drug stores; six shoe stores; four ladies' wear; three restaurants; three men's wear; a juvenile shop; a sewing center; two jewelry stores; a toy shop; paint, candy, hardware, and furniture stores; a bakery; a beauty salon; two barber shops; a music store; a cosmetics store; a curtain shop; a cloth shop, a bank; a one-hour valet; two finance companies; a radio station; an optician; six insurance offices; a lawyer; an accountant; and five auto service stations. Stores extend along East and So. Main Streets for 900 and 700 feet respectively. Ground breaking on the 117-acre development was held January 19, 1955 and the Center officially opened October 6, 1955.

The buildings are of reinforced concrete, steel and masonry with a variety of stone fronts and interior finishing. An attractive twelve-foot canopy of modern design protects the generous sidewalk area. Background music is piped throughout the area. Store hours are 10 AM to 6 PM, Tuesday, Wednesday and Thursday; 10 AM to 9 PM Monday and Friday, and 9 AM to 9 PM Saturday.

The parking lot alone cost $92,000 and has 9-foot spaces for over 2,000 cars. There is a wide cruising lane that circles the parking area with pick-up stations at the super markets, department store and variety store.

The parking area is lighted with sixty Kerrigan Weldforged, continuous tapered, octagon shaped, low alloy steel standards measuring 31 feet 3 inches high. These are mounted on 18-inch concrete pedestals for a total height of 32 feet 9 inches. Poles are spaced at 141 feet north and south, and 133 feet east and west. Lamps are 400-watt mercury vapor, housed in Westinghouse Type OV-20 Luminaires and operate from a 200-260 volt constant wattage ballast.

The project was conceived by Guilford Glazer, Knoxville industrialist, who heads the developer organization, Oak Ridge Properties, Inc. General contractor was Sun Construction Company of Knoxville; architecture was handled by David B. Liberman, also of Knoxville, Tenn.

Oak Ridge is a city of 32,500 population which is only a little more than thirteen years old. It originated as the hub of operations for the Atomic Energy Commission and has been Government owned and operated. With the prevailing interest in future industrial peacetime use of the Atom, Oak Ridge maintains its leadership in nuclear activity. Recently, Congress passed a bill which gives Oak Ridge its own local government and local home ownership. Coincidentally with the passage of this disposal bill, community spirit and activity reached a new high and private enterprise has started on an upward trend. Oak Ridge Properties was the first privately owned company to secure a sizable tract of land from the government for development of a residential community.

CONSTRUCTION DOLLARS SCARCE?

Use Asphaltic Overlay and

Because of the need of improving present-day streets and highways to carry the ever increasing load of heavy traffic, we asked the engineers of the Asphalt Institute to prepare an article on asphaltic overlay and stage construction of bituminous concrete.

LIKE MANY thousands of miles of roads under-designed for today's heavy traffic, a parkway opened to traffic in 1954 is facing a real problem. Part of the multi-lane highway was constructed to carry vehicles of passenger car weight only. Now it is proposed to open this portion to heavy truck traffic. What can be done? The pavement certainly cannot be rebuilt for the cost of such an undertaking would be prohibitive. An economical asphaltic overlay can provide the answer.

For a number of years asphaltic overlays have been making new pavements from old by strengthening them with tough asphaltic mixes. In this way, thousands upon thousands of miles of roads and streets have been salvaged and rejuvenated, making the best use of available construction dollars. Asphaltic overlays also play an important part in stage construction operations—the method by which a road is modernized in a number of construction stages to carry increasing vehicular traffic.

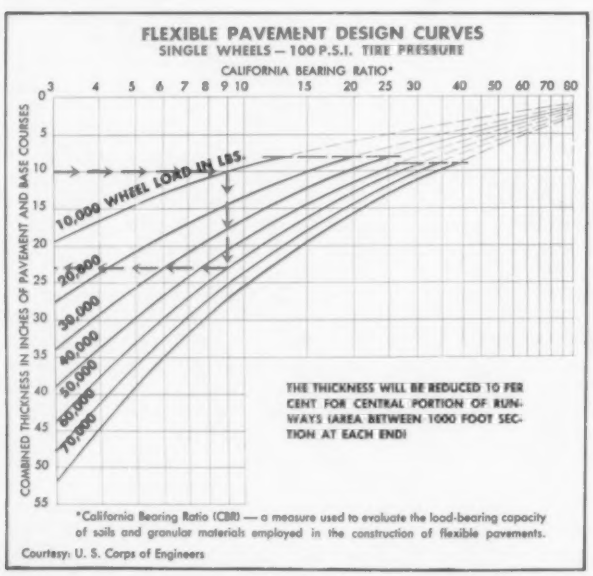
Extensive research and experimentation, conducted principally by the U. S. Corps of Engineers, has brought forth scientific information concerning the overlay thicknesses required for any increase in load-carrying strength. Although the work of the Corps has concerned the bearing capacities of airfield pavement, their findings can be applied properly to highway structures.

Overlaying Flexible Pavements

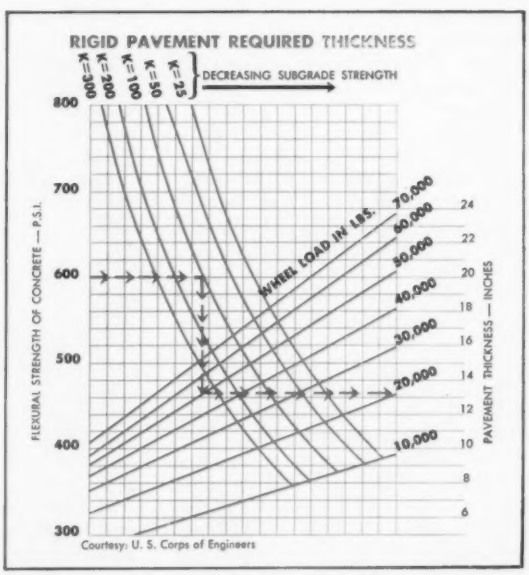
Let us consider asphalt overlaying a flexible pavement (granular base and asphaltic surface). Assume that a flexible pavement 10 inches thick (base and asphaltic surface), is capable of supporting 10,000-lb. wheel loads. Using the design curve in Figure 1, you can see that an effective subgrade CBR of 9 percent is indicated (upper horizontal arrows). Now, by following the downward arrows to the 50,000-lb. curve, it is evident that to strengthen the pavement to a 50,000-lb. single-wheel load carrying capacity, the total thickness of pavement and base required would be 23 inches—an increase of 13 inches.

According to Corps of Engineers' standards this additional thickness should be made up of 10 inches of high quality base aggregates and 3 inches of hot-mix asphaltic concrete surface. Alternatively, the additional thickness might be made up of 6 inches of high quality base and 4 inches of intermediate quality base or subbase material and 3 inches of hot-mix asphaltic concrete surface.

Overlaying and strengthening portland cement concrete pavements constitutes another problem in road reconstruction. As such pavements age with use, asphaltic surfacings are applied. Design procedures have been formulated for determining the required thickness of overlay with asphaltic concrete and other flexible pavement materials. However, asphaltic concrete is used almost exclusively for this type of work. Asphaltic concrete overlays are those in which the full thickness is made up of hot-mix asphaltic con-



● **FIGURE 1. In these curves for flexible pavement design the arrows show how added thickness is determined where wheel loads are raised from 10,000 to 50,000 pounds. The CBR is 9%.**



● **FIGURE 2. Where the load carrying strength of an existing rigid pavement is to be increased, the first step is to determine needed thickness for full concrete design.**

Stage Construction Techniques

crete. Flexible pavement overlays consist of a non-bituminous base plus an asphaltic pavement surface.

Overlays for Rigid Pavements

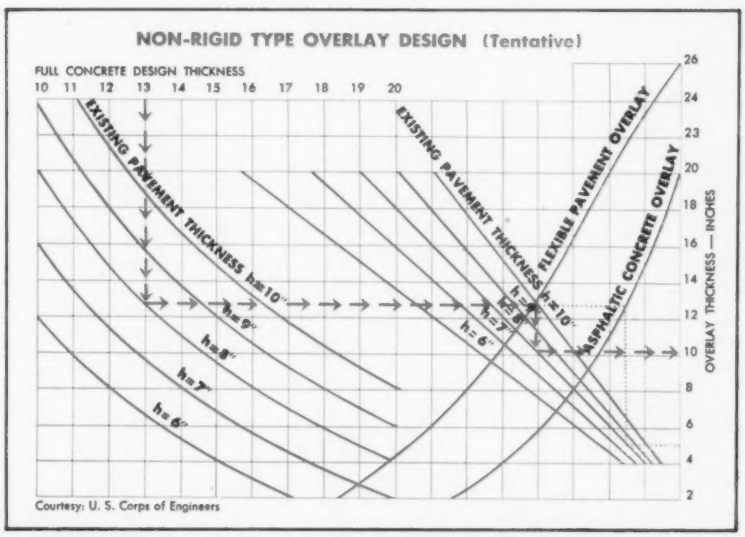
To illustrate the design procedure for this work, assume an 8-inch rigid pavement that is to be overlaid to carry a wheel load of 50,000 lbs. The first step in determining the overlay thickness required for any wheel load capacity is to find the thickness of such pavement required to support the wheel load. In other words, if a 50,000-lb. wheel load strength were desired, what new pavement thickness would be required to meet the load?

To illustrate how this is done, Fig. 2, which has been developed by the Corps of Engineers, is used. Assume that the flexural strength of the concrete is 600 pounds per square inch and that the subgrade has a modulus of subgrade reaction, K, of 100.

To determine the needed thickness of rigid pavement, enter the chart, Fig. 2, at 600 psi. flexural strength and follow the indicated broken lines and arrows. These indicate that a pavement 13 inches thick is required for the 50,000-lb. wheel load.

To determine the required thickness of overlay on the 8-inch existing pavement the chart in Figure 3 is employed. This chart is entered at the top ("Full Concrete Design Thickness") at 13 inches (already determined from Figure 2). Following the arrows, a flexible pavement overlay of approximately 10 inches is indicated. This overlay may consist of 7 inches of granular base and 3 inches of hot-mix asphaltic concrete.

Figure 3 may also be used to determine the required thickness of an overlay composed entirely of hot-mix asphaltic concrete. In reading this chart the same procedure is followed except that the curve to the extreme right, labelled "Asphaltic Concrete Overlay," is used. By following the path of the dotted lines, this indicates that 5 inches of hot-mix asphaltic concrete is sufficient to increase the load-bearing capacity of the existing pavement to the point where it will support 50,000-lb. single wheel load traffic.



● **FIGURE 3. Following determination of full concrete thickness (Fig. 2), these curves are used to find the required thickness of a non-rigid type overlay. Arrows show that 10 inches of flexible overlay is needed to raise wheel loads from 10,000 to 50,000 pounds. Dotted lines are used for figuring hot-mix asphaltic concrete.**

Asphaltic overlays can provide an economical solution to the highway engineer's dilemma of how to squeeze high-strength, modern roads from a shoe-string budget. In many instances, where total relocation of the road is not required, asphalt overlays can transform a broken, narrow pavement into a smooth, safe, modern thoroughfare, capable of carrying today's heaviest vehicular traffic.

Stage Construction

Turning now to stage construction —the method by which a road is modernized to handle today's heavy vehicular traffic in a number of construction stages—this type of construction may involve pavement strengthening or widening; or relocation of the roadway for easier and safer driving or construction of new highways in planned stages.

It is not within the resources of many states to build new multi-lane highways wherever and whenever the need for such thoroughfares exists. New widened and strengthened pavement surfaces can be built over old pavement areas, thereby salvaging much of the original investment in right-of-way land purchases and base and pavement construction costs.

A good example of asphaltic stage construction is found in the 126-year history of part of U. S. 25 as it evolved from wooden plank road to multi-lane highway. The portion of U. S. 25 discussed here extends over the 11 miles between Bowling Green and Perryburg, Ohio. The original road was constructed of plank boards in 1830. In 1867 the road was widened to 24 feet. Timber was cleared from 50 feet of each side in 1872 and in 1909 a stone macadam roadway 16 ft. wide was constructed. From 1917 to today asphaltic mixtures have strengthened and widened the once narrow lane road into a modern highway.

In 1917-18 the road was surfaced with 2 inches of hot-laid asphaltic concrete. A parallel road, 22 feet wide, was built to form 5 miles of divided highway in 1941. This was constructed of 1¾ inches of stabilized subbase course on which was placed 6 inches of asphaltic concrete as a base course and 2½ inches of asphaltic concrete binder and wearing course. In 1947 the parallel road was extended to the full 11 miles between Bowling Green and Perryburg. Construction consisted of 6-inch to 12-inch stabilized subbase, 9 inches of water-bound macadam base course and 3 inches of asphal-

tic concrete. In the same year the old road (16 feet wide) was given a 1¾-inch asphaltic concrete leveling course and was widened 6 feet, construction consisting of 3 inches of asphaltic concrete leveling course on 9 inches of water-bound macadam. Over the full 22-foot pavement 1½-inch binder and 1½-inch asphalt wearing courses were laid.

During the following year modernization of the south portion was carried out to make a four-lane, divided highway over the entire 11-mile section, adequate to carry today's traffic. Widening to 22 feet was accomplished by placing a 5-inch insulation course and a 6-inch asphaltic concrete base course laid in two 3-inch lifts. The entire width was then surfaced with a 1¼-inch binder course and a 1-inch asphalt wearing course.

Completion of the 1947-48 improvements marks the latest step in the construction of a road which grew as the area it served grew. Today, it continues to serve as a main thoroughfare, showing no signs of failure and requiring no expensive maintenance. If the traffic of the future demands even more in the way of load-carrying or vehicle volume capacity, it will be relatively simple to move up another stage to fulfill the requirements of tomorrow.

The North Carolina Idea

Another application of the stage construction technique is found in the State of North Carolina. There, new roads are now built in planned stages which permit the movement of traffic before final heavy-duty surfaces are placed.

After location surveys are completed and final plans prepared, grubbing, grading and the building of necessary drainage structures (first stage) are accomplished, usually in one construction season. The following season, construction of a flexible-type base course with an asphalt surface treatment (second stage) is completed. Traffic is then permitted to move over the road for approximately two years, at the end of which period a high-type wearing surface of hot plant-mixed asphaltic concrete is applied (third and final stage). By this method more miles of highway are opened to traffic sooner than would be possible if all three phases of construction were completed under one contract.

Since North Carolina began its stage construction program four years ago, 300 miles of stabilized aggregate with a prime, mat and seal course have been completed or are under construction. This mileage includes both single and dual lane roadways, each roadway having a width of 24.5 feet. In addition, asphalt construction has been employed in widening over 50 miles of old pavement. Asphaltic concrete surfacing has also been placed on 50 miles of stabilized aggregate which had been previously surface-treated. Of this mileage, there are 21 miles of dual lane construction.

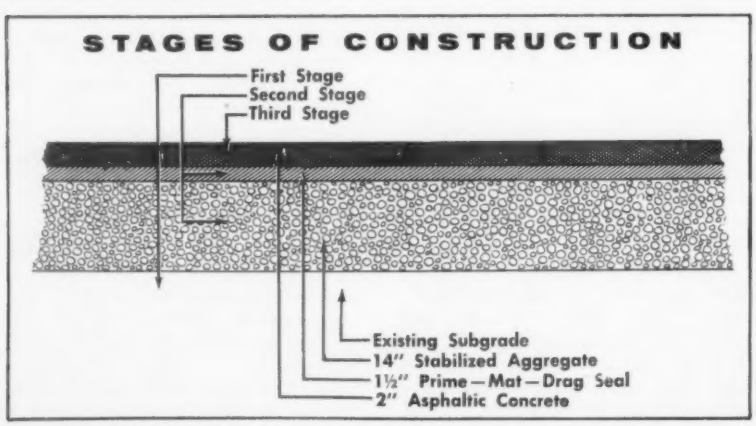
Moreover, 21 miles of stabilized aggregate construction used in the widening of old pavements have been surfaced with asphaltic concrete. As approximately 10 miles of this widening were not surface-treated prior to placing the hot-mix, it received both a binder and surface course.

Substantial Savings

The savings realized by employing the stage construction method in North Carolina have been substantial. On two projects, each about 16½ miles in length, asphalt savings amounted to approximately $230,000 and $435,000, respectively. Yet, the low cost of construction is only one of the advantages of such paving. The asphalt surface treatment applied to the stabilized aggregate base affords a wearing course, requiring no maintenance, that traffic can use for several years. At the same time, it provides an excellent binder course for ultimate construction of the heavy-duty asphaltic concrete wearing surface which, when placed, adds many more years of service life to the highway. If, in the future, it should become necessary to strengthen the pavement to accommodate greater volumes of heavier traffic, a new surface of asphalt mix can be quickly and easily laid.

Asphaltic overlay and stage construction techniques are offering to highway departments the opportunity of building for the citizens of their states durable, economical highways capable of carrying today's traffic—today.

● **EVOLUTION of a modern highway is typified by the century-and-a-quarter history of U.S. Route 25 between Bowling Green and Perrysburg. Details are in text.**



● **THIS CROSS-SECTION shows how new highways are built in three stages in North Carolina to permit traffic before final heavy-duty surfaces are placed.**

AUTOMATIC CONTROLS START and STOP SEWAGE PUMPING ENGINES

BEFORE THE Puerto Rico Aqueduct and Sewer Authority was instituted, each municipality was responsible for the operation and maintenance of its aqueduct and sewerage system. In 1946, the Legislature passed a law creating what was then called the Puerto Rico Aqueduct and Sewer Service. The name was later changed to Puerto Rico Aqueduct and Sewer Authority, and this Authority was given responsibility for consolidating the various systems and operating them under one central office. Much work had to be done. From the beginning the separate systems had operated under difficulties. Both water and sewer services were poor; hardly ply service. There was only one sewage treatment plant in operation in San Juan.

After the Puerto Rico Authority took over, the foresight of the Governor, Don Luis Munoz Marin, the diligence of the legislators, and the ability of the engineers in charge resulted in many changes. The Commonwealth of Puerto Rico has, at the present time, modern water filtration plants yielding pure water in twenty out of the seventy-six towns of the Commonwealth, 24 hours per day. Three are under construction and seventeen more are under project for the near future.

Sewage treatment plants are being constructed all over the Island. There are now 17 operating successfully—none of which was in operation before the Puerto Rico Authority took over. The Authority is at present constructing a modern plant for the capital city of San Juan. This will have a capacity of 30 mgd. of sewage. All equipment will be operated by electricity; however, it is proposed to install an engine generator set with the full capacity of the plant, the engine to be driven by the gas generated in the plant. This engine will be equipped with a Synchro-Start control which will automatically transfer the normal load to the purchased power line in case of emergency. The Wisconsin engine will also be equipped with automatic control for starting, stopping, overspeed and thermal protection of the engine bearings. The engine drives a vertical sewage pump through a Johnson right-angle gear drive.

● **AUTOMATIC pump controls in one of the fourteen sewage pumping stations of the Puerto Rico Aqueduct and Sewer Authority. Twice a week they start standby engine to charge batteries; at all other times they are ready for power failure.**

The information in this article was furnished by Peter B. Castro, Electrical and Mechanical Engineer of the Puerto Rico Aqueduct and Sewer Authority. In charge of installation and operation of equipment, Mr. Castro is an engineer, a graduate of the Pennsylvania State College with special training in the design and application of automatic controls.

Besides the sewage treatment plants already mentioned, there are 14 sewage lift stations using gasoline engines connected to vertical pumps through right-angle gear drives. Every one of these is provided with an RCM Synchro-Start control which will automatically start the engine whenever electrical power fails. The pump suction pit is provided with an extra float switch adjusted to operate at a level a few inches higher than the highest water level at which the other motor driven pumps operate. With the electrical power off, water will commence to rise until the float closes its switch and operates the Synchro-Start control. If the engine does not start immediately, the control keeps cranking the engine for a few seconds and then stops for a moment and then tries to crank a second time. After a few trials, if for any reason the engine does not start, an over-crank signal light will appear, showing that there is something wrong with the engine. Fortunately, all of our engines have started on the first cranking cycle.

Starting Operations

When the engine starts, interesting operations take place automatically in the controls that we are using. The cranking motor stops as soon as the current from the generator energizes the appropriate relay. At the same time current through the cut-out charges the battery and runs the ignition system. As soon as the water reaches a pre-set level, the float switch opens and the engine stops. The control immediately resets for the next pumping cycle.

When pumping sewage, it is ne-

● **SYNCHRO-START control on wall operates standby gasoline engine to maintain proper level in the sump.**

cessary to have as a stand-by unit a gasoline or diesel engine equipped with automatic starting control ready to start in an emergency. Otherwise the sewage would soon flood the engine room, since a by-pass from the pit to alleviate this condition is not practical in this installation.

Previously the installations consisted of electric motor-driven pumps, one of which at each station had a gasoline engine connected to the pump through a ninety-degree gear drive and hand operated clutch. In case of emergency, as when electric power failed, the attendant had to crank the engine to start it and watch the pump carefully. Otherwise the pump would continue running after it had emptied the suction well, with resultant damage. For this reason the attendant had to be present nearly all the time in the pumping station. With the advent of the Synchro-Start controls, one man can care for several stations. Thus, the automatic operation of the controls renders a much more efficient and rapid service besides effecting a substantial saving in labor. The only operational requirement is to shut off the power twice a week for about an hour at a time so as to let the Synchro-Start control start the engine and operate it for about an hour to loosen it up and keep the battery in condition.

New Federal Pollution Control Act

WITH THE SIGNING of the new Federal Water Pollution Control Act, continuation and general strengthening of the State-Federal program for control of water pollution begun under the Act of 1948 is assured. The only legislative step remaining to be taken to get the new program under way is the appropriation of the necessary funds.

The new law authorizes, among other changes, an expanded program of research on all aspects of the water pollution problem; general purpose grants to State and interstate pollution control agencies to assist them in strengthening their pollution abatement programs; simplified enforcement procedures where a State needs such support in dealing with an interstate pollution problem. and financial assistance to municipalities in the construction of sewage treatment works.

In general, the new law follows the pattern of Public Law 845 (80th Cong.) which expired on June 30th. It reaffirms the principle of primary State responsibility in the control of water pollution, with the Federal Government in a supporting role. The Public Health Service of the Department of Health, Education and Welfare is the administering agency, as under the old law.

The provision for construction grants to municipalities is the principal new feature of the legislation. This authorizes appropriations of $50 million a year for ten years, a total of $500 million, to be divided among the cities which are selected by the States and approved by the Surgeon General for such assistance.

Federal grants for construction are limited to 30 percent of the estimated reasonable cost of a project or $250 thousand, whichever sum is less, and the law specifies that at least 50 percent of the Federal funds are to go to cities of 125,000 population or under.

The section in the new law for program grants to State and interstate pollution control agencies authorizes appropriations of $3 million a year for five years. Proponents of this provision pointed out that such assistance has proved an effective means of stimulating the development of State programs in other fields. Many states today have extremely limited budgets—as small as $3 and $4 thousand—for water pollution control work.

G. E. McCallum, Chief of the Water Supply and Water Pollution Control Program in the Public Health Service, who is immediately responsible for administration of the new law, told PUBLIC WORKS that procedures are being worked out with State water pollution control administrators for activating the program and for construction grants provisions as soon as funds are appropriated.

"The water pollution problem in the United States has become a matter of national concern," Mr. McCallum said. "We believe that the new law provides a workable basis for a more effective State-Federal program of water conservation through pollution abatement. As procedures under the new law are worked out with State water pollution administrators and others concerned, specific information will be made available as to the various phases of the program."

• • •

Removing Surface Film in Swimming Pools

The importance of frequent and regular removal of the surface film on swimming pools may be greater than now generally considered, it has been pointed out by C. R. Amies of the University of Alberta. Mucus and associated bacteria from the respiratory tract; subaceous secretions; sun-tan oils; and water-insoluble constituents of other cosmetic preparations tend to accumulate on the surface of the water, and this surface film is likely to enter the mouth and nasal passages of the bather. In this way, infective agents may be communicated even though the main body of water contains acceptable chlorine residuals.

Current methods of sampling, plunging the sample bottle below the water surface, fail to take into account water level accumulations. A quantitative method for collection of surface film samples has been developed, using calcium alginate. Aiding the skimming action of overflow gutters is proposed, using a light, rigid plastic tube, closed at both ends, and having attendants pull the tube slowly through the water at hourly intervals, stopping use of the pool in the process. In view of the findings, wasting the overflow into the gutters is advocated instead of returning it to the recirculation system.

("Surface Film on Swimming Pools," by C. R. Amies, *Canadian Journal of Public Health*, March and abstracted, *U. S. Navy Medical News Letter*, June 8).

55,000 Pounds of Nickel Alloy Used for Expansion Joints and Water Stops in New York Sewage Treatment Plant

LEAK-PROOF expansion and construction joints are a minor item of expense in constructing a sewage treatment plant, yet they are of major importance if leaks, costly to repair, are to be prevented. Acting upon this premise, the Department of Public Works, Division of Sewage Disposal, New York City, specified Monel nickel-copper alloy for such applications in the enlargement of the Bowery Bay Sewage Treatment Plant in the Borough of Queens.

This plant is being expanded to handle 120 million gallons of sewage per day, triple its present capacity The project, scheduled for completion early in 1957, will cost about $14 million; accessory works will cost an additional $26 million.

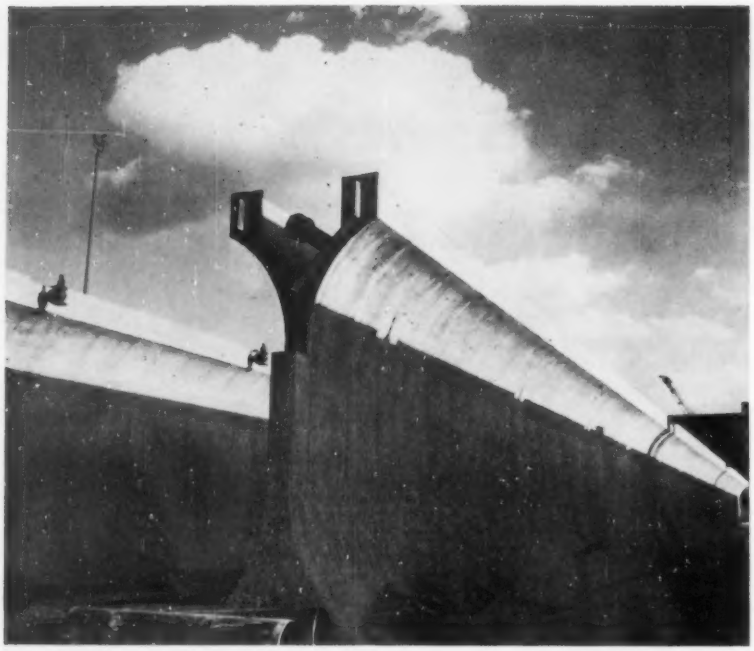
A total of about 55,000 pounds of 24-gauge (0.025 inch) Monel sheet will be used for water stops for expansion and construction joints in the following structures: Six preliminary sedimentation tanks, 124′ x 50′ x 12′; four aeration tanks, 275′ x 92′ x 15′; eight final sedimentation tanks, 211′ x 50′ x 12.25′; two aerated grit chambers, 59′ x 27′ x 14′; four sludge digestion tanks, 81′ diam. x 35′ swd; four sludge concentration tanks, 70′ diam. x 10′ swd; one sludge storage tank, 64.7′ diam. x 19′ swd; a low level screening chamber and pumping station; and the operating galleries between tanks.

About every sixty feet apart in each of the rectangular settling and aeration tanks there is an expansion joint extending across the floor and up the side walls. These allow the concrete to expand and contract as the temperature changes. The expansion joint stop is approximately 15 inches in width, formed with a U-shaped section at the center and with the edges bent on a ½-inch radius. The "U" is packed with a pre-molded sheet filler and the joint is given a ½-inch bevel and finished with joint sealer.

Construction joints are inserted at the end of each day's pouring, if an expansion joint has not been reached. Water stops are provided in all joints required to be water tight — those in exposed exterior walls in contact with sewage and in walls between operating spaces and water bearing soils or sewage channels. For example, in the construction of the digesters and storage tanks, which are 25 to 35 feet high, the concrete is poured in forms around the entire circumference of the tank. The bottom half of the water stop is embedded in the concrete poured one day; the upper half in the concrete poured on the next pouring day, thus preventing leakage through

● **PLACING a section of expansion joint at the end of the aeration tank. Expansion joint filler (black strip) is below.**

● **SOLDERING a water stop, which also acts as an expansion joint; an expansion joint in place is shown at left of picture.**



● **WATER stop is shown in place at end of wall between aeration channels. Nickel copper alloy was used for expansion and construction joints and for water stops.**

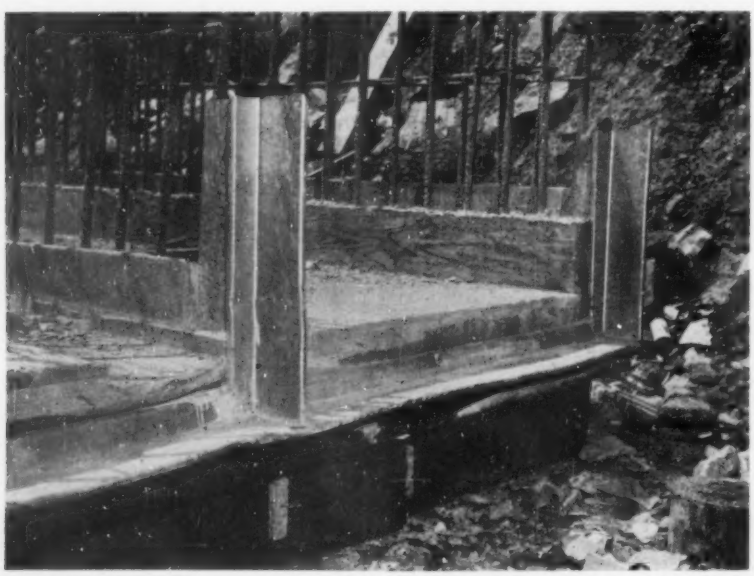
the junction of the two sections.

For the Bowery Bay plant for water stops and expansion joints, fabricated nickel-copper alloy sheet conforming to the requirements of A.S.T.M. Des. B127—49T is specified. The Federal specification for equivalent material is MIL-N-894C (Navy) or QQ-N-281a.

This alloy of approximately 2/3 nickel and 1/3 copper is very resistant to corrosion and has a high tensile strength, about 78,000 psi, and a high modulus of elasticity.

Concrete and Monel sheet expand and contract at almost the same rate. For concrete, the coefficient of linear expansion per inch of length per degree F is 0.0000080 inch compared with 0.0000078 inch for the alloy. This reduces the danger of cracking or other damage during extreme temperature changes. Such damage is most likely during construction, when the structures may be exposed to the sun for weeks or months before completion.

Fabrication of the water stops and expansion joints is being performed by L. P. Kent Company, Bronx, N. Y., sheet metal contractors for the Bowery Bay project. Shapes are prefabricated to fit the contour of the joints and are folded and bent in accordance with prepared section drawings. Bends are made with a minimum radius of ½-inch. The strips are furnished in 8-foot lengths to reduce the number of joints. To make the stops continuous and water tight, joints are lapped and pre-tinned at least one inch, riveted with Monel rivets and soldered.



● **HORIZONTAL expansion joint in floor of aeration tank in foreground, lower part of picture. Vertical expansion joints are shown at each side of the influent channel.**

● ● ●

Preparation for Winter

(*Continued from page 87*)

season the individual Districts maintain 24-hour communication during storms by telephone and radio with the Department headquarters in Boston; 24-hour operation of the central radio station at the main office is maintained without interruption throughout the season for the receipt of reports of conditions throughout the state, and for the transmission of special forecasts and bulletins.

Each District Highway Engineer is held responsible for planning his own winter operations and for maintaining satisfactory road conditions within his District.

In addition to the maintenance planning for winter operations, much can be done in the design of highways to simplify and assist in these operations. Adequate drainage, culverts, paved shoulders and ditches and paved waterways installed in the improvement or construction of highways greatly increase the effectiveness of snow removal and reduce the cost of the operation. Providing storage space for snow in cut sections by means of wide shoulders is also considered by maintenance men to be a very important design feature.

At this time, when a general expansion of and improvement to the country's highway system is under consideration, it is hoped that features which reduce later operating costs, including the few mentioned above, will receive the attention of all design and project engineers. Both taxpayer and future maintenance engineers and superintendents will be the beneficiaries of such foresight.

GARBAGE

RALPH W. RIKER
Director of Research,
Sanitary Disposal Corporation

Can Produce Revenue

PERHAPS the engineering of the Riker composting method by Johnson & Anderson of Pontiac, Michigan, for the Sanitary Disposal Corporation of Lansing, Michigan, may be the answer to revenue from waste disposal. This system is the result of four years of research with city garbage, digested and undigested sludge and many other organic wastes. The research covered the use of several methods of composting with and without inoculants.

A model plant was constructed for Williamston, Michigan, which has a population of 2,500 and is growing rapidly. The installation provides capacity for a population of 5,000. The plant is built on the banks of the Red Cedar River, next to a new sub-division with many fine homes; some residences are within 150 feet. During the past year of experimental operation there has not been a single complaint from the residents in the neighborhood.

The composting chambers are of steel construction. Each unit consists of 8 chambers, with a capacity of 4 tons each. There are two such units giving a total capacity when loaded, of 64 tons of raw material. Each chamber is equipped for the induction of moisture and air to aid the fast multiplication of the aerobic bacteria, and for the removal of the excess gases from the composting material.

The Williamston plant was designed as a dual purpose plant, embodying both sewage and garbage disposal. The sewage solids are pumped from the settling tanks to the composting plant unit where they are dewatered by a Komline-Sanderson Coilfilter, then fed into the mixer with the ground garbage that is passed through a Jeffrey hammer mill (without water lubrication). Here the living aerobic bacteria are added to the continuous mixing operation. Thence, the mixture passes into a Hapman conveyor, which elevates it to the top composting chambers. This same conveyor also removes the finished compost to the storage bin, where it is reground for bagging.

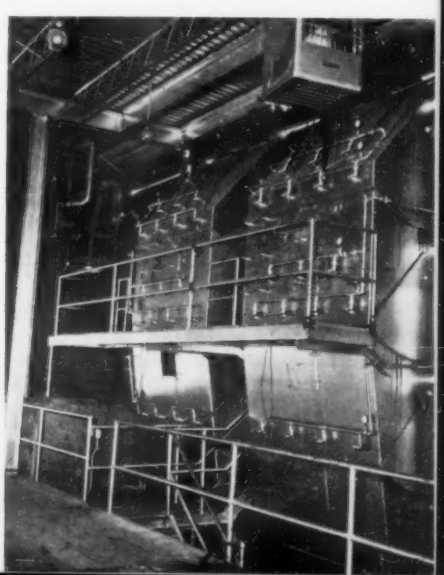
The finished compost carries moisture contents of 40 to 50 percent when it is removed from the composting chambers. It has been found that it should be bagged with at least 40 percent moisture in order to supply the bacteria with enough moisture to keep them alive and make them active when the material is used for plant food.

From records that have been kept during operation, the costs of composting the garbage and the sewage sludge have been low. When the value of the end product is taken into consideration, this system of disposal will supply an income and should amortize the cost of the construction of the plant in a short time.

Williamston is passing an ordinance requiring that all garbage be wrapped in paper. This improves collections and the paper when ground with the garbage picks up excess moisture but does not lower the quality of the compost.

Designs of 25 to 100 tons per day capacity plants are being prepared for larger city operations. These plants are designed so that trucks can dump their loads into hoppers. The garbage is fed from these hoppers to a sorting belt, where glass and tramp metals are removed manually; then over a magnetic pulley which picks up small metal particles, such as bottle caps and can covers. The garbage then enters grinders.

During the experimental operation at the Williamston plant, a great deal of study was devoted to determining at what temperature the anaerobic and pathogenic bacteria had been eliminated. Most satisfactory results were obtained in the temperature range from 110 to 130° F. The average NPK analysis was 2-2-2.



● OUTSIDE view of a Riker composting plant located in Michigan, below. At the right is an interior view showing the steel composting chambers which do the work.

"We Buy the Best Equipment and Keep it Modern." That's how a

FAST GROWING COUNTY

FRED R. LEMCKE

Greene County Engineer,

Xenia, Ohio

A TREMENDOUSLY rapid growth of population in both Greene County and surrounding counties in southwestern Ohio has placed a heavy burden of traffic on our county roads.

We believe we are solving the problem by a many-sided attack that includes: 1. A year-around road maintenance program that emphasizes prompt attention to trouble points; 2. the use of new construction materials such as pre-stressed concrete beams to speed bridge and road jobs; 3. emphasis on purchase of good, modern road building equipment with an accurate cost accounting system to determine when to unload older machines; 4. regular inspection and maintenance of equipment; 5. a three-year program to convert all gravel roads to blacktop; and 6. rapid communications through the use of two-way radio.

Our road and traffic problems are similar to those found in any fast-growing area—only perhaps more so. Our population increased about 58 percent in the ten-year period 1940-1950—from about 32,000 to more than 58,000; and the expansion continues with county officials estimating 75,000 residents living in the county today.

Actually, there is very little industry in Greene County itself and by and large the county acts as a feeder corridor to the highly-industrialized Dayton area. Of course, this high percentage of commuter traffic places a strain on our county road network.

About 90 percent of the huge Wright and Patterson air fields are located in Greene County. Traffic moving to and from these fields further complicates our highway problems. A traffic check revealed that 38,000 civilian and military vehicles move in and out of these fields in one day.

● **TWO-WAY radio has a vital part in the efficient operations of Greene County. Shown at the "mike" in this pick-up truck is Lawrence Fawcett of the County staff.**

This heavy burden of traffic makes fast action on road maintenance a "must". Without prompt attention an ordinary chuck hole can develop quickly into big, expensive trouble. Therefore, we do not wait until spring to do our patching. In fact, we carry on as many maintenance jobs as weather will permit during the winter as well as the rest of the year. In addition to patching, we also do structural work (culverts and the like), erect guard rail, repair bridge decks, and handle as much of our grading as possible in the winter months. Our "stitch in time saves nine" philosophy also applies to the materials we use. In particular, we have found the use of pre-stressed concrete beams for bridge construction highly successful.

Our first experience with pre-stressed concrete came in 1953 when a much-traveled bridge in the northern part of the county was washed out. By the use of "T" construction pre-stressed concrete beams, we were able to complete the 42-foot structure in just six weeks. And that time covered the complete job, including wrecking the old abutments. After placing the beams we needed only to lay 2½ inches of T-35 blacktop to finish the job.

At that time, the freight costs of having the beams shipped to us from the east were high. But countering this factor was the fact that we had no deck to form and no beams to weld up. As for maintenance, we have had no beams to scale and paint periodically. But perhaps most important was the saving in time. We felt that the cost of the detour to the public should be taken into consideration. A check showed that the detour was costing Greene County drivers about 1,000 gallons of gas or about $300 a day. Only a few days' saving in time would pay for the additional cost of the pre-stressed concrete beams. Now the beams are starting to be manufactured locally and they will be fairly competitive in price with standard materials.

Our Major Equipment

As far as equipment is concerned, we place great emphasis on buying

SOLVES HEAVY TRAFFIC PROBLEM

the best and keeping it modern. We maintain a constant turn-over of equipment. When our cost accounting system shows that a machine is getting expensive, we trade it in on something newer. Heading our road building equipment force is a Huber-Warco 5D-190 motor grader. The machine has a torque converter and full power shift transmission. It handles all our heavy-duty maintenance grading, ditching and new road construction. Its brother machine, a standard transmission Huber-Warco 4D-115, handles the more routine grading assignments. We have Gledhill snow plow attachments for both Huber-Warco graders for working heavy snowfalls. For lighter snow we use "Vs" on three of our thirteen dump trucks, and one-way plows on the rest.

Other major equipment on our road building and maintenance force includes a ¾-yard crawler-mounted Lorain shovel; a ½-yard Lorain roller; a Galion 5-8-ton tandem; an Etnyre tar distributor; four Hi-Way hopper-type cinder spreaders mounted on International trucks; a Chicago Pneumatic air compressor; a Hobart welder; five tractor mowers (two International, a Silver King, an Oliver, and a Ford); a 1,000-gallon weed sprayer that was built as a custom job; thirteen dump trucks; thirteen pickup trucks; a Kelly-Creswell three-line center liner; and a 1,500-watt portable generator.

We consider maintenance of our equipment just as important as road maintenance, itself. All equipment is inspected and serviced regularly. We are fortunate to have ample garage and storage space for all our gear.

In addition to being responsible for the 370 miles of roads in the county system, we also play a part in construction and maintenance of the 368 miles of township roads. For all townships our office helps to prepare plans and estimates; and for all except two or three which let jobs to contractors, we actually do the work and are reimbursed.

Of the 370 miles of county roads only 36 miles of gravel remain. By blacktopping 12 miles a year we plan to eliminate all gravel during the next three years. Of course, we consider this a goal worth shooting for because of the decreased maintenance costs of blacktop roads as opposed to gravel.

Although we have some new road construction to accommodate new housing developments, much of our present paving work consists of widening existing county roads. We plan to contract out about 12 miles of widening jobs this year.

Two-Way Radio

Greene County's Highway Department was one of Ohio's first to use two-way radio. It certainly has paid off in both tangible and intangible ways since it was installed eight years ago. At the start, we operated in conjunction with the sheriff's network but since we have established our own system. Radio saves us both time and travel expense, and helps in many other ways on which it is difficult to set a price. For example, it gives us a flexibility and potential to cope with emergency not otherwise possible.

At the present time we have a Motorola two-way system with 500-

● **GRAVEL road maintenance will soon be a thing of the past. Within three years all gravel roads will be blacktopped.**

mobile crane and dragline; a D-6 Cat bulldozer; a Tractomotive front end loader; an Athey force feed belt loader for loading berm into trucks; two Buffalo-Springfield 12-15-ton three-wheel rollers; one Buffalo-Springfield 8-10-ton tandem

● MODERN building is headquarters for County Highway Department. Two-way radio antenna is mounted on top of building.

watt input and 250 output, one of the largest radio networks for our type of operation. Of our total of ten two-way units—five are in pick-ups, two in cars, one in our survey wagon with headquarters at the courthouse and a remote at the highway garage.

As yet, I haven't mentioned the most important single asset in our department — experience. The 35 members of the department average 20 years of service each and this wealth of experience is invaluable. Because each man can handle many different jobs and do them well, we have a flexibility of manpower that is hard to duplicate. All key men in the department have a rich background of experience—Howard Devoe, Superintendent of Roads; Edwin R. Rector, Assistant Superintendent of Roads; and Ben Pierce, Chief Deputy.

There are two interesting sidelights of our operation and one is our covered wooden bridges. We have 13 of them left and we are now working on a program to replace one a year. Although they make picturesque landmarks, they are not very efficient in this modern age of travel. However, we hope to save one or two of these bridges because of their rustic beauty.

● BUILT in six weeks, this bridge illustrates advantages of use of prestressed precast concrete beams. Blacktop is placed on top of beams to produce finished job.

DUAL-FUEL ECONOMY
Offsets Power Plant Expansion Costs

WITH EARNINGS at an all time high, the Wells, Minn., municipal power plant purchased a new Fairbanks-Morse 1920-hp. opposed-piston, dual-fuel engine; retired $50,000 in outstanding bonds, and contributed $15,000 to the community, avoiding an additional levy on the taxpayers. All this was accomplished despite a reduction in the rate schedules in 1954. In addition, the municipal utility retired a balance of $45,000 in bonds in 1955, leaving the plant completely free of debt.

Earnings have been strongly on the upswing since 1950 when the plant began converting from straight oil to dual-fuel operation. Having supplied electricity for Wells and surrounding agricultural areas since 1895, the plant switched from steam to oil engines in 1931, installing three F-M diesels totaling 660 hp. and adding a 600-hp. unit four years later. A fifth was installed right after the war, a 7-cylinder engine, rated 1400 hp. at 300 rpm. Its sixth, a 10-cylinder opposed-piston engine of 1600 hp. went into service in 1950, and was converted from diesel to dual-fuel operation in 1951. This unit, one of the first F-M opposed-piston engines to operate on dual-fuel, was so economical that the plant converted its 1400-hp. engine to dual-fuel in 1952.

At the end of 1953, Wells was producing 7,067,484 kwh, an increase of 14.1 percent over the previous year, and showed a net income of $82,758.81, 15.1 percent higher than the previous year and the highest earnings in its history. The utility states that this record was directly attributable to the increased use of low cost gas fuel.

The plant's earnings made plant expansion in 1954 a simple matter to finance. First on the schedule of expansion was the building of a one-

story brick building between the plant and the distribution department warehouse, tying them together and providing new offices and a garage.

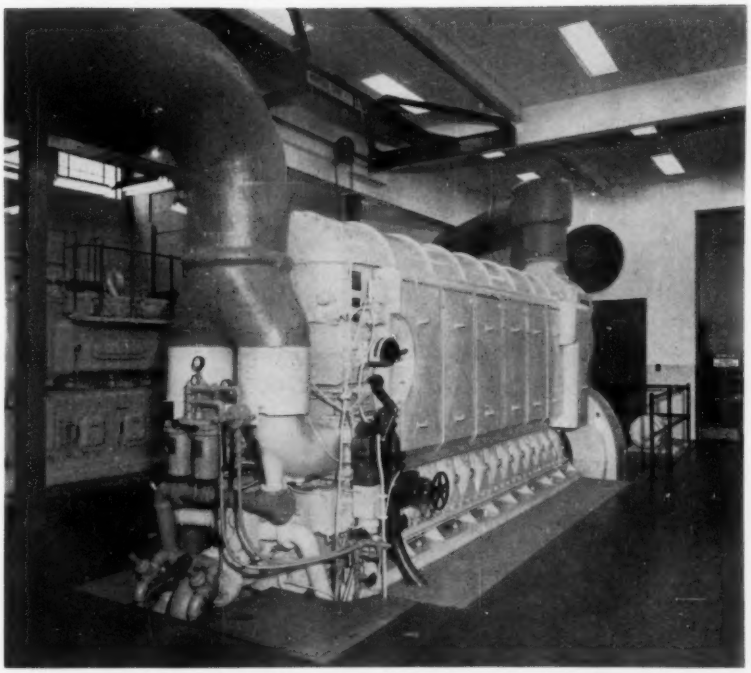
The three straight oil diesels that had been in service since 1931 were dismantled and removed, and the new 1920-hp. opposed-piston, dual-fuel unit installed. A partial basement was constructed for the engine's accessory equipment. The engine room walls and ceiling were covered with acoustical tiles to make it quieter and brighter. Two of the three engines that were removed from the plant after 23 years of operation were sold for further service in Wisconsin and Iowa.

The new engine, which brought the total horsepower up to 5520, proceeded to make significant reductions in plant fuel costs almost immediately. Although no figures were available for gas consumption of individual units in 1954, the plant's totals for all engines indicates the contribution of the new engine.

In 1953, the plant produced 7,670,000 kwh while consuming 93,181,000 cu. ft. of gas and 133,711 gal. of oil. This represented an average of 12.14 cu. ft. of gas and 0.0174 gal. of oil per kwh at an average cost of 5.2 mills. In the last 8 months of 1954, with the new dual-fuel engine in service, the plant generated 5,489,300 kwh on 61,582,200 cu. ft. of gas and 76,860 gal. of oil for an average of 10.1 cu. ft. of gas and .0104 gal. of oil per kwh. The plant's average fuel cost was cut to 4.5 mills per kwh.

In a month of maximum production by the new unit, the plant has operated on 9 cu. ft. of gas and 0.012 gallons of oil per kwh at an average fuel cost of 3.72 mills. Based on this showing, the utility looks forward to more operating economy than ever before in the coming years. All figures cited for 1953 and 1954 include some straight oil operation.

Putting the new unit's accessory equipment in the partial basement allowed for more working space on the floor level. There is a centrifugal jacket water pump on the new engine and also a motor-driven centrifugal pump with a separate line to carry jacket water to the coils in the forced-draft cooling tower which serves the entire plant. Another economy was achieved by circulating the jacket water through pipes in the floor of the new offices and garage for radiant heating. Lube oil is circulated in the unit by an engine-driven pump and the circuit includes a full-flow strainer and a lube cooler. Natural gas is fed to the plant's three dual-fuel engines through separate iron case meters with a base volume index and direct reading on back. The unit switches automatically to oil if gas pressure fails and gas is cut off automatically if pilot oil or lube pressures fail.



● **INTERIOR of the Wells, Minnesota, municipal power plant. This 12-cylinder, opposed piston, dual-fuel Fairbanks-Morse engine is rated at 1920 hp at 720 rpm.**

The utility's management was highly satisfied with the overall results of the expansion and improvement program. Maintenance costs were cut from a low of 0.74 cents per hp. in 1953 to an extremely low 0.29 per hp. in 1954. Moreover, dressing up the place promoted better maintenance thereafter, and the new look plus the quiet operation of equipment made the plant a better place to work in for all concerned.

This municipal power plant, which has long been valuable to the community, has increased its value each year. It provides a dependable source of power at moderate rates; it has contributed to the municipality in the last four years a total of $60,000 which would otherwise have been raised by imposing additional levies on the citizens; and it has financed many public improvements—$20,000 for a well and pump; $20,000 for a mercury vapor street lighting system; and $65,000 to the local hospital. All plant equipment has been paid for out of earnings.

● **POWER PLANT, offices, garage and distribution department warehouse. The new central portion, housing offices and garage, tie buildings into unified structure.**

● SEWAGE plant, right, and water plant, left, serve 1,500 homes in Carol City but can be expanded to care for 10,000.

SEWAGE DISPOSAL in Mass Subdivision Building

DAVID B. LEE

Director, Bureau of Sanitary Engineering,

Florida State Board of Health

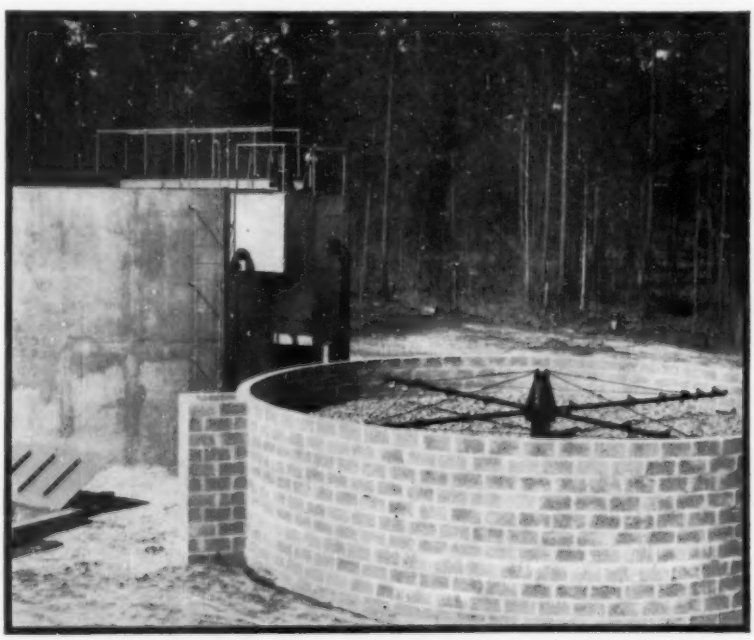
Jacksonville, Florida

IN THE PAST 10 years, the urban fringe has seen the installation of millions of septic tanks, far more than had been eliminated by sanitary engineering services in the previous 50 years.

The septic tank has been installed not only for those who have land and income generous enough to accommodate and maintain the facility, but for families who have neither the space nor the resources to prevent the development of a sanitary nuisance and a public health hazard. Septic tanks may work well in rural areas if people do not live too close to each other or if they use only a little water for bathing, laundry, air conditioning and dishwashing. To put it simply, a septic tank is a country cousin that came to town and promptly got into trouble. In its place (a rural setting), the septic tank and subsurface drain field is a suitable method of domestic sewage disposal, given adequate drainage, soil conditions, and water table; but it was never intended for use in areas with more than one family dwelling per acre. Even this may be too dense for septic tanks if soil conditions and water tables are not satisfactory.

Under rural conditions, and with proper design, construction, and maintenance, this system will usually give a degree of satisfactory performance. If failure of the soil absorption system occurs under rural conditions, the danger to public health is minimum since there are plentiful opportunities to choose another location for a new system. In urban areas, the septic tank is often a needless, and frequently an extravagant, method of sewage disposal. It threatens to be a sanitary nuisance and a public health hazard to millions of home owners.

The post-war building program is probably yet to reach its peak in many areas of the country. The housing deficit, accumulated since 1926, has been overcome only in



● IMHOFF tank and high rate filter are principal units in Holiday Hill sewage treatment plant. These units give good results, are economical and expansible.

isolated communities and for a few income groups. Much of the housing built since 1940 has been only a passing palliative to housing needs. Millions of housing units, fundamentally well built and well equipped, are already too small for growing families. With rising incomes, families are demanding more housing. If you add to these factors the steady obsolescence of aging buildings, spatial shifts of population, and the rising birth rate, it is apparent that the current production rate of 1.3 million dwelling units a year is not excessive.

6 Million Septic Tanks

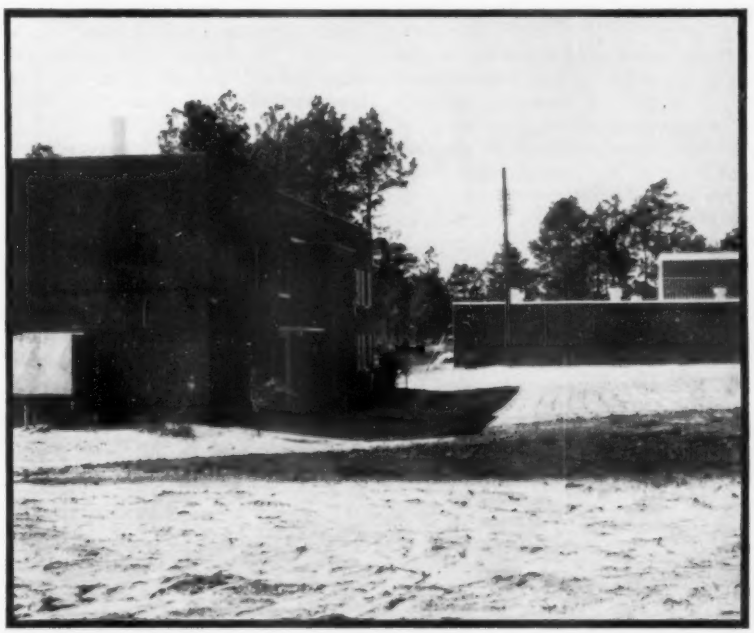
Accurate figures are not available but it is estimated that at least 24 million persons are served by 6 million individual septic tank systems in the United States. Of even more importance, it is estimated that more than one-third of the new homes now being constructed will have septic tank systems for sewage disposal. All of this continues against the better judgment of many in the public health profession, and presents one of the greatest challenges to be faced in the years to come by sanitary engineers and others in public health work.

The mass building industry is chronically in need of land, low-priced land, in large tracts. Such land is seldom to be found within city limits, where zoning laws and city plans apply, and where community water and sewerage facilities are likely to be present or required. Mass builders usually find the land they need in territory where governing authorities have had limited experience in urban development. It is unlikely that in such an area there is any local person equipped to supervise the builders and their sewage disposal plans. The burden of supervision usually falls on the county and State officials and, in some instances, on the insuring and lending agencies. Even so, in the interest of profit and sound construction, progressive mass builders would prefer to put in community water and sewerage facilities. What stands between them and their better judgment is a matter of money.

Typically, a builder does not construct 200 houses wholesale and then sell them in one lot. In phase building, he finishes one house at a time. And he sells one at a time, as the units are finished. Even if his sales are committed in advance, settlement of the title is closed only as the individual houses are finished.

Naturally, he wishes to recover water and sewerage installation costs on each house at it is sold. Such recovery is easiest when the house has a private well and septic tank.

It is not easy to recapture the investment in community facilities with any rapidity. To provide community sewerage facilities for no more than 500 units would tie up between $150,000 and $200,000 while the houses are in construction. It may take some time before this investment can be freed. There have been few, if any, financial institutions willing to carry that kind of investment, especially for builders who may sell no more than 50 to 100 houses a year. Such financing is certainly not practical for the typical builder who needs a fast turnover on limited capital simply to keep himself going. Even mass builders are susceptible to the appeal of the fast return of their money. Some have ventured to use septic tanks with projects of as many as 8,000 homes.



● **SEWAGE treatment plant, left, and water aerator and ground storage, rear, are designed to serve 2,450 people in San Jose subdivision, located near Jacksonville.**

Advantages in Sewerage

Given financing, it would be to the great advantage of both the builder and to the community to install water and sewerage facilities. To deal with sewage disposal alone, the Florida builder can install sewers at a cost ranging from $150 to $250 per lot. To include the cost of sewage treatment facilities for 500 families in my own State would run the total charge for sewage disposal facilities to $300 to $400 a dwelling. The superior attraction of a house with sewerage connections will enhance the market value of the structure by some amount over and above the ordinary charge for septic tank installations. Although the increased value of the house may return a price that will pay for the community sewage collection and treatment facilities, title to the plant would remain with the builder. Furthermore, by collecting sewage service charges, he may cover operating, maintenance, and amortization costs, and so recover his investment. Meanwhile, the community would have the advantage of a trouble-free waste disposal system. The gross income from 500 houses with community water supply and community sewerage may amount up to approximately $30,000 a year. Such an operation is practical with as few as 200 houses.

Recognizing such financial advantages, 120 subdivisions in Florida have installed their own community sewage disposal facilities and community water systems in the past 5 years. But several were motivated also by a stern refusal

by Governmental officials to permit septic tank construction in areas where such disposal methods were not suitable.

It can often be demonstrated that the average cost of a septic tank and subsurface disposal system, and the cost of maintaining and operating such a system, is certainly equal to, and in many cases, more expensive than, a monthly sewer service charge for a method of sewage disposal that is not only safe but trouble-free.

Corrective Measures

Once septic tanks are in, especially in areas with a high water table, poor soil conditions, and relatively dense settlement, the corrective measures frequently require that they be by-passed. They may serve well during dry periods but let the rains come and the soil is quickly saturated. From the ground will come noxious gases; tank effluents will appear on the surface and may back up into bath tubs or prevent the flushing of commodes. As this was written, on January 24, 1956, two ladies called me to report that more than 100 septic tanks in their subdivision had failed in the past 24 hours. The gases coming back through their plumbing and into the house were so serious that they had to open the house and use their attic fan. This was beside the fact that their yards were flooded with tank effluent.

In one subdivision during 1955 with 180 homes of a high financial bracket, soil conditions were such that 25 home owners were obliged to construct relief sewers from their drain field to the roadside ditch in order to allow the wastes to escape.

Since sewerage is the only practical correction to effective septic tank installation, it seems obvious that in mass building projects, sewers should be installed when the homes are built.

We, in Florida, recommend that all new houses construct their plumbing and locate their septic tanks, when they use septic tanks, on the side of the house or in the front so as to facilitate eventual connection to a sanitary sewer.

Preventive Measures

What can be done to assure that mass housing projects of the future will be built with adequate community sewerage facilities?

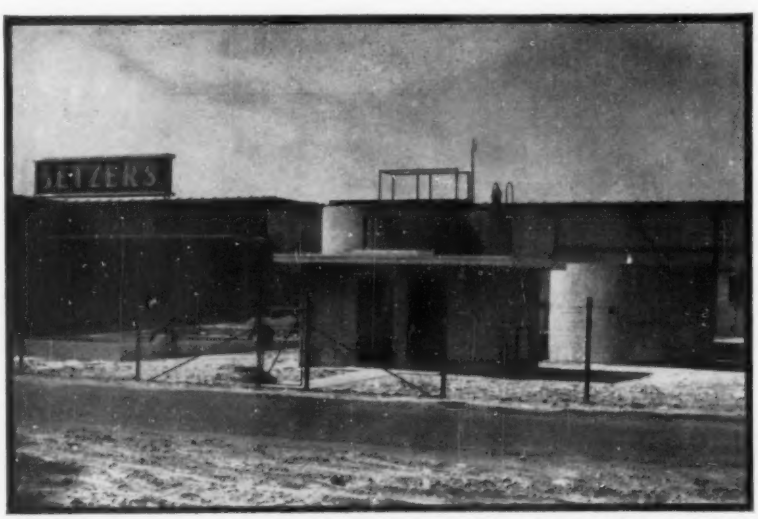
Of all possible means of preventing undesirable septic tank construction in the future, aggressive direct efforts by government officials, by builders and by insuring and financing agencies, are most likely to produce results. Governments and political subdivisions can strive to overcome artificial political barriers which today strangle rational urban growth, and which, in fact, encourage undesirable building in outlying areas at the expense of well-established urban centers. Whether it is done by creating sanitary districts, metropolitan or regional planning authorities, county and State zoning officials, new boundaries, or local governmental holding companies, the accommodation of urban growth is a primary political responsibility of local and State governments.

If local and State government imparts such political muscle to zoning and planning commissions, it can not be too heavily stressed that members of such commissions should be independent of financial pressure and of political and special interests. Commissions should be staffed by qualified and intelligent laymen as well as professional personnel with merit system status. They should also be sensitive to the welfare of the people and be interested solely in the development of the area they serve and the part it plays in the development of the State and our Nation.

The most immediate opportunity for good work in urban growth, however, is in the hands of agencies which insure, guarantee, or underwrite funds for residential construction and development. It would be to their own interest and protection to assure loans for community water and sewerage facilities and to require such systems for all dwellers whose financing they insure in mass building developments. If these agencies would do no more than agree to insure mortgages on community facilities, builders, the financial people, sanitary engineers, and others will surely work out the details. In my opinion, the greatest need in housing today is for leadership in the financing of community water and sewerage facilities.

Summary

Based on the experience of the writer, it has been repeatedly demonstrated that the septic tank in congested neighborhoods is uneconomic, unwise, and unwholesome. Its widespread use in recent years may be due largely to the failure of local government officials to assure wise and orderly development of new neighborhoods and to the failure of financial institutions to encourage builders to install community sewerage facilities. Inasmuch as sewerage facilities are the only practical alternative to the use of septic tanks, their construction must be encouraged if we are to avert the installation of millions of septic tanks in the next 10 years. All governmental agencies need to organize better methods of managing urban and suburban growth. But immediate benefits will result from agreements by insuring and lending agencies to finance community facilities for water supply and sewage collection and treatment.



● TOWN and Country Shopping Center has modern waste treatment. Control building center; Imhoff (Spirahoff) tank in background, with final high rate filter.

A WATER PROJECT SPROUTS in a DRY AREA

PARIS L. GUY
Formerly Director of the Water and Sanitation Dept., Aurora, Colorado

WATER is often—or always—a problem in areas of low rainfall and small stream flow. Aurora, a suburb of Denver, grew and grew —from 3437 in 1940 to 35,000 in 1955. During these years of growth a severe drought affected Denver's water supply. Aurora had relied on the Denver supply for all water uses under a distributor's contract which is a year-to-year agreement with the Aurora Water Department acting as the central purchasing agent and redistributor of the purchased water to residents in Aurora. The drouth enlarged the water problem for the Denver Water Board at a time it was diligently proceeding with litigation and construction work to obtain additional raw water supplies for the rapidly expanding Denver Metropolitan area. During 1955, Denver received a decree entitling it to additional water supplies in the Blue River of the Colorado River drainage area, l cated across the continental divide from Denver.

As early as 1952, the Denver Water Board, realizing that the growing Metropolitan area would soon use all of the available water, established an imaginary line around the Metropolitan area, beyond which water service would not be extended until Blue River water was available. The so-called Blue River line, as established in 1952, allowed the City of Aurora some 50 acres of area for additional development with further development to be contingent on the provision of Blue River water which, it was contemplated, would be available in about 1962.

Since the so-called Blue River line was established, a critical water shortage has occurred; the City of Aurora has grown to the so-called Blue River line; and the demand for development continues unabated. The Aurora City Council evaluated the city's position with the type of industrial, commercial, and residential development it was experiencing in 1954 and embarked on a program to provide sound long range planning for the development of Aurora.

This future planning resulted in annexation of industrial lands with trackage which will ultimately provide the necessary economic base for Aurora. The expansion of the City into these areas required a new water supply, inasmuch as the so-called Blue River line did not include these lands.

In 1954, the Aurora City Council engaged C. H. Hoper and Company of Denver to study available independent water supplies, both surface and well, which might provide water service to those areas outside the Blue River line. The engineer's report verified the lack of water available from deep wells and recommended a temporary shallow well development to be supplanted later by surface waters from the South Platte River. This supplementary water could come from Denver's Blue River development, or from an independent development by Aurora.

The Cherry Creek Well Water system was designed by Kenneth R. White, Consulting Engineer of Denver. The plan had two objectives: First, to establish an immediate supplemental supply; and second to provide connection possibilities with water conduits now being planned by the Denver Water Board or to a future independent supply for Aurora. The provision of the two plans within the Cherry Creek Water Project, required that ultimate future design be accomplished and constructed at this time.

Conduit Design

The design as prepared by Mr. White provides 27-inch steel fabricated in accordance with the general requirements of the AWWA Specifications C202-49, reducing to a 24-in. line at the South City limits. The 27-inch line is designed so that every third joint (forty feet per joint) will be Dresser coupled, and the two intervening joints bell and

● **JOINTS** are bonded for cathodic protection and bolts are made tight.

● **COAL TAR** is applied about the coupling and fiberglass wrap begins.

● **FIBERGLASS** wrapping is taped at ends of coupling to make tight cocoon.

● **COCOON** is filled with coal tar after trench is partially backfilled.

spigot field welded. To facilitate testing of welded joints in the field the bell ends were provided with a ⅛-inch drilled and tapped hole for the attachment of pressure gauges and air cylinders. The materials and application of protective coating were based on AWWA Specifications C204-51 which include interior and exterior grit blasting, priming and coating with coal tar enamel, and the exterior wrapped and bonded with asbestos felt wrapper. A coat of water resistant whitewash is applied over the asbestos felt wrapper. The Thompson Pipe and Steel Company, Denver, was the successful bidder for furnishing the fabricated steel water conduits.

"Cocoons" Cover Joints

Mr. White's requirements on field joint Dresser coupling protection is the commonly referred to "cocoon" method. The cocoon joint used in this particular project is formed by wrapping the coupling with the fiberglass which is taped at its extremities. Prior to the filling of the cocoon with coal tar, the coupling receives cathodic bonding with a 1/0 gauge wire and a backfill of dirt is made around the pipe up to approximately its center-line. The coal tar when placed in the cocoon, fills all voids in and around the follower ring and bolts of the coupling and tends to tamp down the loose backfill of dirt. Previous experience with the cocoon method has illustrated the need of some backfill to prevent the tape from pulling loose and to prevent sag of the cocoon.

The cathodic protection to be provided will be completed after the installation of all conduits. The present protection applied is the insulation of the couplings at periodic intervals along the 27-inch conduit; and all connections to this conduit are isolated by an insulating coupling (Dresser Style 39).

A 4-million gallon reservoir will be provided for the Cherry Creek Water Project. This will be constructed by the Hammond Iron Works of Provo, Utah. As in the case of the steel water conduit, the reservoir is designed for the ultimate planned capacity.

The design and planning by Mr. White represented excellent timing. The fabrication and delivery of all of the steel conduit provided the control timing for all other necessary material such as valves, chlorinators, flow meters, pumps and controls. The miscellaneous valves were received with delivery, and price well within the desired limits. Valve bids were awarded to Mueller and Iowa Valve. Fischer and Porter equipment was installed for chlorination, and Builders-Providence equipment for the control of pumps and recording of levels and flow. Radio control of pumps from the reservoir site and water department offices has been added since the original design and a contract has been awarded the Radio Specialists Company of Denver. This radio control will receive impulse from the Builders-Providence reservoir level control and transmit this impulse to the Pump Control Building located in the well site area where it will be converted by Builders-Providence equipment into a pump signal for operation. For emergency purposes, a control has been placed in the water department main offices to overlord all signals and stop all pumping operations. Further to coordinate the radio pump and reservoir control, the Federal Communication Commission has been requested to authorize an audio channel between the main offices in Aurora, the reservoir site and the pump control building in the well site area. The present mobile radio equipment owned and operated by the city is not capable of reaching all points of the area of development and has almost reached the maximum in audio traffic.

Construction is in progress with water conduit installation completion expected in late 1956. This will represent approximately 70,000 lineal feet of 27, 24, 16 and 12-inch diameter steel main. The steel reservoir construction began early this summer. Total project cost will be approximately $1,500,000.

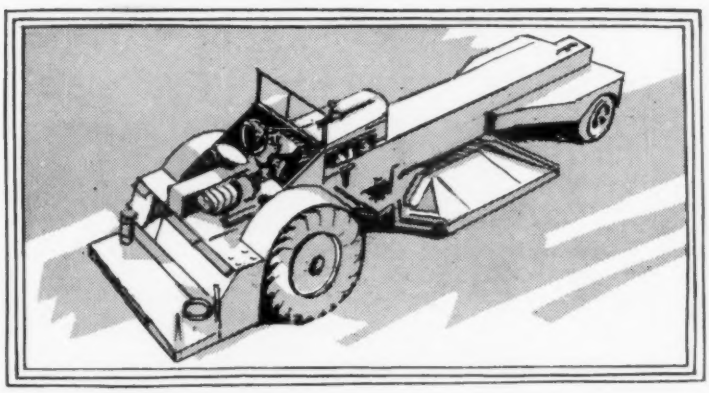
The development of the Cherry Creek Water Project typifies a first phase of long range planning with specific aims and needs of a planned community in mind. The first aim is to permit the use of either of two possible future paths to obtain additional water supplies for the City of Aurora; secondly, a start is made on the basic establishment of water facilities that are going to be adequate to provide the necessary quantities of water in the various areas of Aurora; and thirdly, it provides the necessary volumes of water to attract industries.

Double-Checking Flow Helps Predict Future Demand

BY USING BOTH orifice and water meters to double-check each other on a water well output line, the Water Department of Weimar, Texas, obtains accurate data on water consumption which will help in estimating water demand five years hence.

About a year ago, a 3-inch Rockwell Eureka "B" water meter was installed on the output line of Weimar's most recent water well. While accurately indicating total flow, this meter does not furnish rates or time of flow. To obtain this information, Weimar officials decided to install a Rockwell orifice meter and time recorder on the line, just ahead of the water meter. With the modified setup, the two meters can be used to check against each other as well as provide data on total flow, rate of flow, and time of pump operation.

SURFACE HEATER-PLANER *Solves* ASPHALT MAINTENANCE PROBLEM on CITY STREETS



● HEATER-planer is shown here in sketch by artist. How it works is told in the article on this and next page.

L. H. TEMPLETON
Supt. of Public Works,
Chattanooga, Tennessee

HEAT, HILLS and heavy traffic cause serious rolling and shoving of bituminous pavement on Chattanooga's 150 plus miles of busy black top streets. This has been a continuing problem for the public works department for many years. However, we now have it solved permanently and economically, thanks largely to our new Littleford-Clarkmoore heater-planer which the department purchased last September.

In the past we tried to cover over the rough spots with a new course of asphalt mat. This was expensive and the repairs lasted only a short time as the new course was soon rolled and shoved into the same shape as the original. We tried to "whittle" the rolls down with a grader equipped with a blade. Although we reserved these experiments for the hottest days, this

● OPERATION of the heater-planer over uneven areas of the pavement resulted in removal of surface layers of varying thickness. The planed material is left in a windrow which permits easy pick-up and loading into a truck. Much of the material removed by the heater-planer could be reclaimed and used on secondary streets.

● **BLADE placed immediately behind heater hood shaves off a thin slice from the surface wherever irregularities occur. The blade is reversible.**

method was unsuccessful because much greater heat and more powerful planing action were required than we were able to get.

Some time ago I observed a heater-planer demonstration at an American Public Works convention in Knoxville. That city had one of the earlier models of the heater-planer, but as soon as I had seen it in action, I realized that this machine could put an end to our asphalt maintenance worries.

Our heater-planer unit has worked well. An example is the intersection of Fifth and Glenwood Streets. A 60-foot section was badly cracked as a result of wintering. A few passes with the heater-planer completely removed the cracks and we believe this section will not need attention again for many months.

In operation, the heater-planer windrows the planed material behind, where it can be shoveled by our labor crew into the dump truck. This material is put to good use in patching secondary streets. In steady planing, we estimate that we can plane off at the rate of 5 to 6 tons per hour. We normally operate at a speed of approximately 15 feet per minute although when planing off high spots we move as fast as 30 feet per minute. The depth of cut varies but we can remove up to 1 inch in thickness when planing. When starting to plane, the adjustable blades are set level. Then by means of adjusting screws on each blade these are set for the desired depth of cut. Under ordinary conditions we set the blades for about one-fourth inch cut. As the unit moves down the street the varying contours of the street surface will cause the blade to cut at different depth along its edge. For example, one side of the blade may be planing a half-inch depth, but the other side only an eighth of an inch. The resulting planed surface is smooth because the rear wheels of the unit always ride on the planed surface.

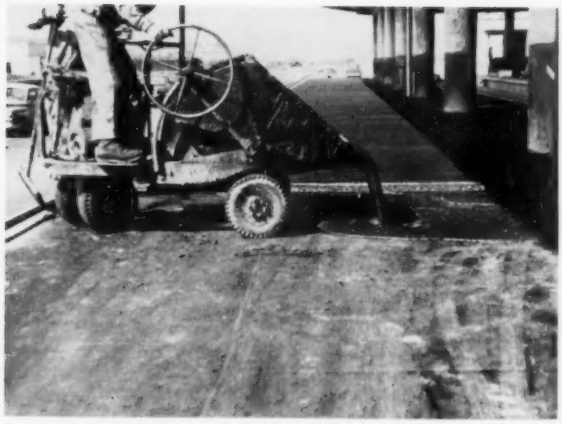
The overall width of the blade assembly is 81 inches and the blades are reversible. The hood which houses the burner is 82 x 108 ins. Blade life varies with the type of pavement being planed, but an idea as to the blade life would be approximately one week of steady planing.

Maneuverability of the heater-planer is important to us. Our unit is easier to handle than most trucks, both at planing speeds and over the road. This reduces traffic congestion. We never have to block off our streets for planing operations. A high speed reverse permits us to plane in easy stages, back up and take as many passes as we like.

We like the mobility of our unit. It travels over the road at 20 mph. We can drive it to the job in the morning and back to the public works garage in the evening, eliminating the need for overnight standing on the street.

● **THOUGH two lanes (half the street width) are being used here for planing operations, the truck and front-end loader can follow planer, requiring only one lane.**

● **AUTHOR, L. H. Templeton, gives instructions to operator J. H. Dunn during construction. Use of this equipment has helped solve one of Chattanooga's problems.**



● **MOTORIZED** wheelbarrow places free-flowing mix as a second step in construction of the mastic floor covering.

● **FINISH** consisted of Laykold black Wearcoat. Plastite seal was later applied to some areas to facilitate cleaning.

COLD ASPHALT BINDER *Speeds* FLOORING JOB

TWO-STAGE construction, made possible through use of a cold-applied asphalt mastic binder, enabled contractors to minimize delay and cut labor costs in the construction of nine acres of flooring at the new U. S. Post Office Building in Seattle, Washington.

The new three-story reinforced concrete building, which measures 200 ft. by 600 ft., including outdoor loading platforms on sides and rear, occupies a three-acre tract. Total floor area, including all three stories, is 385,000 sq. ft. The building was constructed by the Terminal Development Co. for the Post Office Dept. on a 20-year lease basis. One feature of the lease agreement calls for the lessor to maintain the floors (and the roof) for the duration of the lease. Durability, therefore, was an important factor in the selection of the mastic.

Contractors first primed the concrete floor of the building with a double coat of Laykold cold-applied asphalt mastic binder mixed with four parts water. Angle iron screed strips were then placed. Mix of a free flowing consistency was next spread with a motorized wheelbarrow. Strike-off was accomplished with a light-weight aluminum channel straight-edge. When the mixture had set for approximately one-half hour, it was "floated" with a long-handled aluminum bull-float.

After from four to twelve hours, depending on weather conditions, the surface was fog-sprayed with water and floated with a light-weight three-bladed Whitman power float (trowels with float attachments). On the following morning, the mixture was normally fogged again with water and then power-troweled with a heavy-duty unit.

The quick-setting characteristics of the Laykold mastic enabled contractors to open the floor to painters, electricians and other trades after a period of from 36 to 48 hours. Painting and fixture installations were completed and even a portion of the machinery was set in place. Then the floor was given one squeegee coat of a mixture of Laykold Wearcoat and sand (2 parts Laykold to 1 part sand) and finished with a coat of black Laykold Wearcoat to provide a durable waterproof seal for the wearing surface.

The two-stage floor construction procedure made possible substantial savings in labor costs by minimizing delay ordinarily encountered during long curing periods. Use of a fog-spray provided the necessary amount of water for proper curing and hydration which, in turn, resulted in a floor completely free of cracks. In addition, adequate troweling at the proper time developed a dense, compact mastic with high resistance to indentation.

Thickness of the Laykold mastic averaged ½ inch throughout the building. Approximately 30,000 gallons of binder and 5,000 gallons of Wearcoat were used on the job. A Plastite seal was later applied to the finished flooring in certain areas to facilitate cleaning.

The flooring contractor on this job was the Raecolith Flooring Company of Seattle. The general contractors and lessor to the U. S. Post Office, were the Howard S. Wright Co. of Seattle. John Graham & Son were the architects. Laykold Asphaltic Products were handled through the Portland District Office of the American Bitumuls & Asphalt Company and the Raeco Sales Company of Seattle.

MOST BENEFICIAL ENGINEERING

NEW ORLEANS SPEAKS of its Union Station and Grade Separation program as the most beneficial engineering project ever undertaken in any city. It is one of the greatest in magnitude. The method of financing by enlightened cooperation is more fantastic than a deal in fiction, requiring no increase in taxes. The gain may be described as making an articulated city out of a confusion of constricted zones.

Bigger than any of the physical features is the act of rare courage by Mayor deLesseps S. Morrison when he took office in 1946, in declaring that all of the piecemeal plans for improvement must be combined in one master plan. With that stroke of administrative genius he put wheels under the project, and it began to roll.

Anyone who had to travel in and out of New Orleans before that time will accept these statements without contest. There were five obsolete railroad stations widely separated, serving nine trunk lines. There were 144 grade crossings, many of them on main streets. The difficulty of getting to and from stations, and changing between them, was shared by residents and visitors who had to get about the city. Movement was constricted within areas or zones bounded by railroads, and the opening of one crossing started a traffic rush to the next one. The movement of trains was no easier on the spiderweb of rails used by the nine lines.

The metropolis was growing so fast that this strangulation was intolerable. In the postwar years it had spent $100 million a year in private residential and industrial construction. In seven years before Mayor Morrison cut the planning snarl, $800 million were spent in the metropolitan area on new plants. New projects costing $220 million were planned, such as a $10 million post office to be built adjoining a new Union Station; a $100 million tidewater channel to the Gulf, with modern docks and warehouses to cost as much more; a $1.2 million international trade mart; a $7 million veterans hospital; other hospital construction to cost $2 million; and a new $20,000,000 bridge across the Mississippi River.

For a hundred years New Orleans had transportation pains. Mayor Shakespeare tried to promote a Union Station in 1882, and the agitation became increasingly acute through succeeding years. Street cars encouraged people to live farther out, and increased the concentration of pedestrians downtown. Then automobiles pyramided the street congestion to chaotic proportions.

● CLAIBORNE Ave. Interchange on the new Pontchartrain Expressway, shown by the artist's drawing. Expressway, the upper structure, will cross the Lake.

With it had come an inertia, a state of frustration, a stand-still. Mayor Morrison continued the Terminal Board which had been created by his predecessor, and then appointed a 202-man committee to get to work on a program made up of four projects: Union Station, grade separation, major street improvements, and a new civic center. Out of this came the UPT (Union Passenger Terminal) Committee, made up of 18 representatives of the city, the Terminal Board, the Public Belt Railroad Commission, and the railroads. This committee was responsible for building the terminal, and continues in the function of operating it for the city.

Such a stupendous step was not taken without opposition. Several suits were filed by a small group of property owners and political adversaries of the mayor, seeking to enjoin the basic contract with the railroads and the several bond issues voted for the city's share of expense. These suits had to be fought through local, state and federal courts, and delayed the program for about a year. Similar opposition was stirred up against the proposed location of the Union Station, coming mainly from certain property owners.

Master Plan

The spirit of New Orleans is volatile and spontaneous, in the manner of the French, and the masterful boost by Mayor Morrison on the "up" side of the churning controversy set the stage for a master plan. For professional assistance the committee retained Robert H. Moses, Park Commissioner and planning expert, of New York City. G. A. Heft & Company, of New Orleans, became consulting engineers on the over-all plan. Other engineering and architectural firms took over parts of the work as the units could be isolated for individual design. City departments and engineers stepped into their roles as the plans progressed.

Consolidating the five railroad stations and nine trunk lines in one Union Station was the key project, and big enough in itself. The pivot on which the whole plan turned was filling the New Basin Canal, to make the the 300-ft. right-of-way for Pontchartrain Expressway, com-

PROJECT CUTS TRAFFIC SNARLS

ing straight to the new station from Baton Rouge Airline and carrying U.S. Highways 51, 61 and 65 into the city. This roadbed carries also the terminal approach tracks.

This consolidation had to be programmed to put all parts of the jigsaw plan into their places methodically with no interruption of daily passenger and freight traffic, and no traffic jamming on the streets. About 46 passenger trains arrive and depart every day, with more than 100 passenger train movements on such a crossing as South Claiborne Avenue, a critical point in construction plans. Freight movements add up to even more — certainly much more along the water front.

Some of the problems of train operation versus construction are stimulating. The new station building is 140 ft. wide and 260 ft. long. The main approach tracks are 200 ft. wide and more than a mile long. Behind the station, tracks extend for about four miles through the center of the city, on a right-of-way used by the Kansas City Southern and the Louisville & Nashville, on an old canal that had been closed and covered. The coach yard has 10 tracks 14 cars long, and the engine zone has 5 tracks for 40 engines. Six passenger platforms under canopies are 20 ft. wide and 20 cars long, serving 12 tracks.

The old Illinois Central station, which served also the Southern Pacific and Gulf Coast lines, had to be kept in operation while the new terminal plant was constructed over and around it. No building in daily use was demolished until a replacement had been built in the new plan. The old express building sat right on the site selected for the new station building. So it was necessary to build a new express building. This was the first new unit.

Before new tracks could be laid, several old warehouses had to be razed. The new coach yard could not be built because it had to go precisely where the old coach yard stood. A small additional coach yard was built for the Illinois Central, Southern Pacific, and Gulf Coast lines. This released part of the old yard for construction. Piece by piece the new yard was completed and put into service. Then everything around was cleared out for completing the already-started power house.

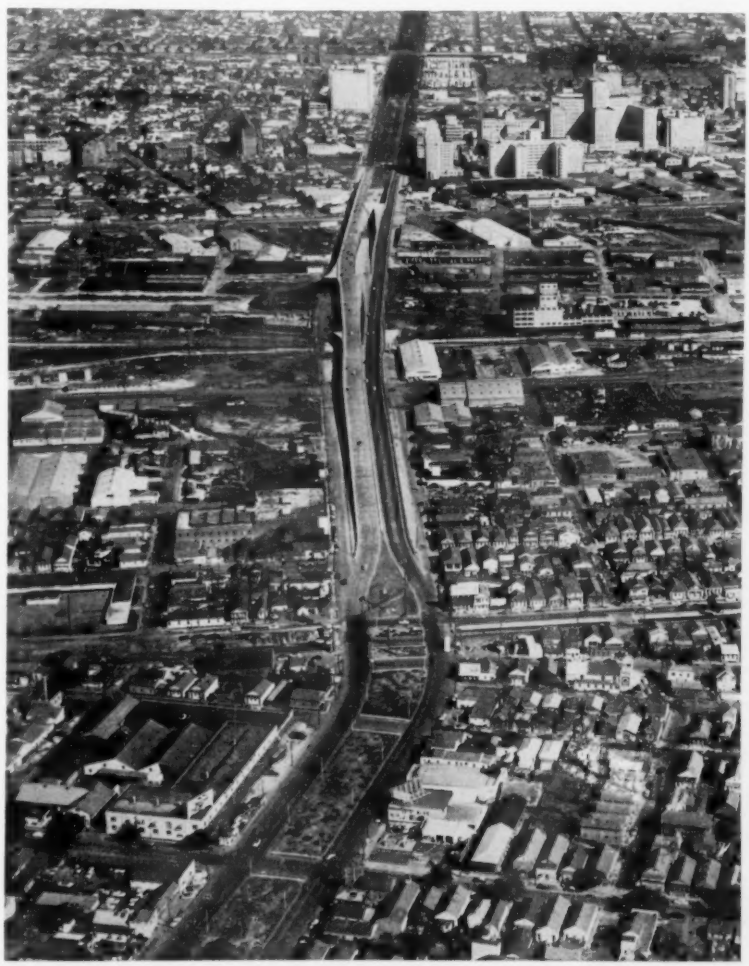
Temporary train platforms and canopies were built on the other side of the old depot to maintain service while the new platforms were constructed close by. The $16,000,000 station was the last unit to go up. The station is of the stub-end type, for there are no through trains. It may be the only terminal in the country in which all trains really terminate.

Grade Separations

When this master plan was started there were 144 grade crossings in the city. When it is finished there will be 24 crossings, and only one of these will be on grade on a passenger line. To rub out 120 grade crossings—many of them very hazardous —in a few years, sounds like magic. The magic is in consolidating five railroad stations in one, and removing the intricate trackage of nine trunk lines which laced back and forth across the city.

Of the 24 crossings that remain, 23 will go over or under the tracks and other streets, and one will continue on grade. Many of these 23 structures were completed by the beginning of 1956. Work is being pushed rapidly on the others. Some of the smaller ones are big enough to make the front page in any community.

The largest job, South Claiborne



● **NEARLY a mile long, South Claiborne Overpass will have two 40-ft. wide roadways. The middle spread permits ramps to surface streets if desired in the future.**

PROJECT CUTS TRAFFIC SNARLS

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The old Illinois Central station, which served also the Southern Pacific and Gulf Coast lines, had to be kept in operation while the new terminal plant was constructed over and around it. No building in daily use was demolished until a replacement had been built in the new plan. The old express building sat right on the site selected for the new station building. So it was necessary to build a new express building. This was the first new unit.

Before new tracks could be laid, several old warehouses had to be razed. The new coach yard could not be built because it had to go precisely where the old coach yard stood. A small additional coach yard was built for the Illinois Central, Southern Pacific, and Gulf Coast lines. This released part of the old yard for construction. Piece by piece the new yard was completed and put into service. Then everything around was cleared out for completing the already-started power house.

Temporary train platforms and canopies were built on the other side of the old depot to maintain service while the new platforms were constructed close by. The $16,000,000 station was the last unit to go up. The station is of the stub-end type, for there are no through trains. It may be the only terminal in the country in which all trains really terminate.

Grade Separations

When this master plan was started there were 144 grade crossings in the city. When it is finished there will be 24 crossings, and only one of these will be on grade on a passenger line. To rub out 120 grade crossings—many of them very hazardous—in a few years, sounds like magic. The magic is in consolidating five railroad stations in one, and removing the intricate trackage of nine trunk lines which laced back and forth across the city.

Of the 24 crossings that remain, 23 will go over or under the tracks and other streets, and one will continue on grade. Many of these 23 structures were completed by the beginning of 1956. Work is being pushed rapidly on the others. Some of the smaller ones are big enough to make the front page in any community.

The largest job, South Claiborne

● **NEARLY a mile long, South Claiborne Overpass will have two 40-ft. wide roadways. The middle spread permits ramps to surface streets if desired in the future.**

In addition, the railroads are paying out $4,875,000 for the changes they must make in their individual facilities. By doing this the roads made it possible for the city to reduce the number of grade separations that the city expected to construct, from 50 or 60 to 24. And besides these items, the roads are paying their pro-rata share of the cost of filling the New Basin Canal, and 15 percent of the cost of the grade separation structures. In total the railroads will have spent about $25 million when the job is finished.

Other Improvements

The city is paying 85 percent of the cost of the grade separations, or about $19,724,000. This will come from the proceeds of two municipal bond issues, $19 million, plus supplementary funds. If this seems high, city officials respond by reviewing the estimated cost of the improvements that would have been built without a Union Station consolidating the trackage and depot facilities.

Besides these extraordinary improvements the city is spending about $3,533,000 for other street work, such as a connection to the new Union Station plaza for the Loyola Avenue-Earhart Boulevard. Without the Union Station project the cost of this imperative construction would have been many times more. It would have been a critical major project.

The State Highway Department bears a pro-rata share of the cost of filling in the New Basin Canal, and is doing the work. It is building the South Claiborne Overpass, costing $4½ million. To this latter project the city contributed $1,135,000, an amount which it would have spent at this location if the master plan had not been adopted. The Highway Department is also building the big interchange overpass at Pontchartrain Expressway and Carrollton Avenue, to which the city has contributed $800,000 by the same reasoning; and the Department is carrying the full cost of the Expressway. Altogether the Highway Department will spend about $8,515,000 as its share of the total cost.

Adding up all the expenditures by the three parties, the cost of the master plan project will be well over $57 million.

Another item in the total program, which is only accessory, is the purchase by the city of a slum area for a civic center which is to cost $20,000,000. Here will be concentrated all municipal, state and federal office buildings. The area has been cleared and turned into a parking lot for about 3,000 automobiles, something badly needed in the center of the city.

There will be no increase in taxes. Ten mills of the city's current revenue are marked for liquidation of bonded indebtedness, and this is expected to cover both interest and principal payments on the new bonds.

Public Attitude

The change in the attitude of the public through the progress of this monumental face lifting is interesting. The first bond issue, when the program was merely a proposition, passed in the ratio of about 13 to 11.5, indicating considerable coolness and doubt. This close ratio is not surprising on a new project of such magnitude in a very conservative city. Lack of study and fear of tax increases would make it so. But the next issue passed by a ratio of 2 to 1. The change was due in part to the steady effort of the city administration to prove the value of the project, but mainly to the actual construction going on and the opening of more new structures to public use.

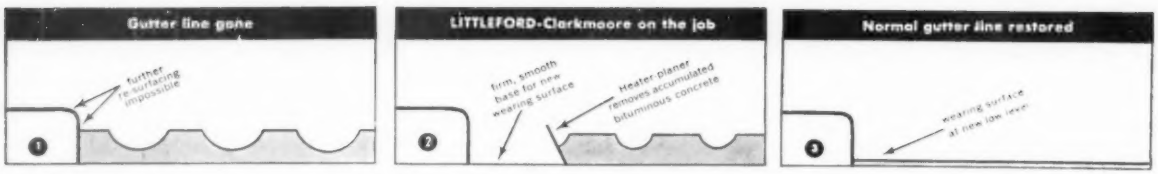
It is certain that if the bond issues were to be voted today the approval would be overwhelming. It is so easy for the taxpayer to see now how badly the city needed the foundational revolution in its layout. Some may bemoan the loss of the old complacent and provincial way of living. Many will require time to get used to unobstructed expressways running for miles through what were formerly congested areas. And many will hardly believe their eyes when they walk through a beautiful concourse in the Union Station straight to their trains.

New Orleans as a whole is experiencing the feeling of being released from shackles, able to think of itself as one of the greatest ports and cities in the country, without restriction.

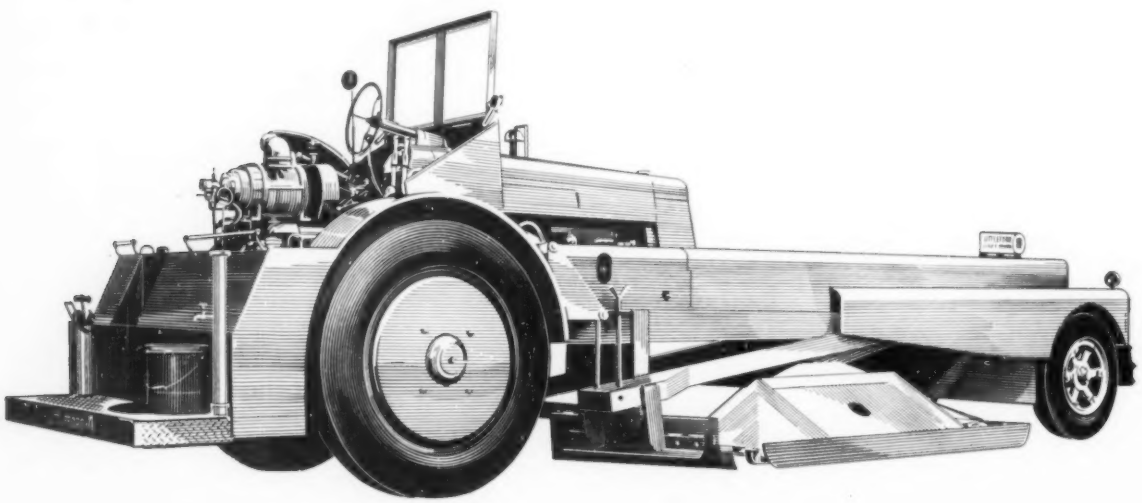
The Chamber of Commerce and other civic bodies have been foresighted and generous in their praise, withholding no measure of commendation, and this feeling will gradually sift down through the populace to bring out a sense of appreciative comprehension. It will take time.

As one public acknowledgment there is the citation of the Chamber of Commerce of April 27, 1954, making public recognition of "the unselfish and untiring efforts of the Terminal Board and the Terminal Committee; congratulating both agencies for the intelligence and skill demonstrated in the planning and execution of the program; and cite each member of both agencies for the conspicuous and laudable public service performed."

● **STANDING alone, this North Claiborne St., Overpass of railroad tracks would be an outstanding project. Here it is but one of the small units in the whole plan.**



Littleford-Clarkmoore Heater-Planer and Surface Heater introduces a new technique in street maintenance



Littleford has now solved another critical problem: *what to do about removing black top and avoiding the disappearing gutter line?* The Littleford-Clarkmoore Heater-Planer and Surface Heater planes thick, heavy bituminous concrete like so much shaving soap . . and leaves the road surface so smooth you can lay the wearing surface directly on it.

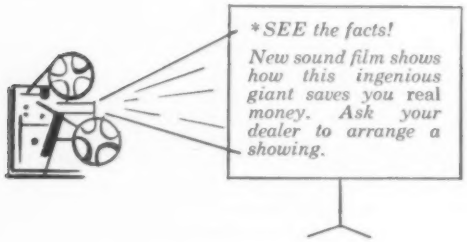
Thus Littleford introduces a whole new technique in street and highway maintenance. Contractors and highway departments have been hampered heretofore by the lack of an efficient tool for removing excess bituminous concrete accumulated layer on layer, year after year.

Now the Littleford-Clarkmoore Heater-Planer and Surface Heater not only removes the excess material from streets and highways, it also heats and planes a firm, smooth base for the new surface and helps keep it at the proper level (see sketches 1-2-3 above).

And don't overlook these additional uses of this ingenious new machine:

- ★ Can be used as a surface heater without planing action.
- ★ Levels out troughs on straightaways.
- ★ Smooths out corrugations on hills, at traffic lights and stop signs.
- ★ Planes off top surface to prepare for surface treatment.
- ★ Removes fatty sections or slippery places.
- ★ Roughs up bad hills to avoid skidding.

Before you buy, check the Littleford-Clarkmoore. You'll find it the perfect tool for better black top maintenance. Write for bulletin 18. Littleford Bros., Inc., Dept. 195, 452 E. Pearl St., Cincinnati 2, Ohio.



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NEWS BULLETINS

AMERICAN PUBLIC WORKS ASSOCIATION, 1313 EAST 60th STREET, CHICAGO 37, ILLINOIS

California Chapter Elects New Slate of Officers

Oakland, California—John L. Kergel, Senior Highway Engineer, Division of Highways, California Department of Public Works, was elected president of the Northern California Chapter of the American Public Works Association at the Chapter's regular monthly meeting in Oakland, June 15, 1956. Olof E. Anderson, Chief Deputy Surveyor of Alameda County, was named vice president and Karl G. Heine of Pacific Telephone and Telegraph Co., secretary treasurer. A feature of the program was the highly instructional movie—"WASHO ROAD TEST." Earlier in June, twenty-eight members of the chapter were guests of the Pacific Gas and Electric Company on an overnight trip to the Caribou Plant in the Feather River Canyon, in Plumas County.

Wisconsin Chapter Holds Meeting in Sheboygan

Sheboygan, Wisconsin — The annual spring meeting of the Wisconsin Chapter was held at the Sky Garden Restaurant in Sheboygan May 18, 1956. Members and their guests were welcomed to the city by Mayor Rudolph Ploetz at the morning session which also included the presentation of the film "Drama of Portland Cement" and a discussion of the cement industry expansion program by Gene Goeb, Field Engineer for the Portland Cement Association. Those in attendance, after luncheon, saw another film — "Streets of America", and exchanged views on concrete paving specifications and the techniques that may be used in selling the public on undertaking a street paving program. The concluding feature of the meeting was a tour of Sheboygan's street improvement program under the direction of R. E. Fleischer, Director of Public Works of the host city.

St. Paul Public Works Official Heads Minnesota Chapter

Detroit Lakes, Minnesota — Over fifty members and guests were present at the June meeting of the Minnesota Chapter which was held in Detroit Lakes, in conjunction with the annual meeting of the Minnesota Municipal League. Walter Schultz, Assistant Engineer (Plans and Surveys) of the Minnesota State Highway Department, gave a very informative talk on the "Proposed Inter-state Highway System in Minnesota," and Frank C. Marzitelli, Commissioner of Public Works of St. Paul, spoke on the "Status of the Proposed Highway Amendment No. 2." His talk dealt with the method of allocating state-collected motor vehicle tax money to 87 counties and to 54 cities and villages of over 5,000 population under the proposed amendment to the State's Constitution. The highlight of the business meeting was the election of Mr. Marzitelli to the presidency of the chapter. Theodore Oleson, City Engineer of Fairbault, was elected vice-president and Erwin Hensch, City Engineer of Fergus Falls, secretary-treasurer.

Highlights of Federal-Aid Highway Act of 1956

Washington, D. C.—The largest governmental construction program in history was adopted by Congress and signed into law by President Eisenhower during the last week of June. To finance the program, the Federal tax on a gallon of motor fuel was raised from 2 cents to 3 cents; tires are taxed at 8 cents per pound; and excise taxes on trucks and buses were increased from 8 percent of the manufacturers' price to 10 percent. The new law also imposes an annual tax of $1.50 per 1,000 pounds on highway vehicles weighing more than 26,000 pounds and taxes material used for recapping or retreading tires at 3 cents per pound. The new taxes are expected to produce $14,814,000,000 in revenues during the next sixteen years.

The aggregate amount of the authorization during the next 13 years is $24,825,000,000. The formula of apportionment contained in the Federal-Aid Highway Act of 1954 will be followed for the first 3 years. For the remaining 10 years, the funds will be apportioned in the ratio which the estimated total cost of completing the Interstate System in each State bears to the estimated total cost of completing the Interstate System in all of the States. Federal funds will be used to pay 90 percent of the total construction cost of Interstate Highways, and States will be required to pay 10 percent. The new law also started a gradual step-up in the regular Federal-Aid highway program by authorizing appropriations of $2,550,000,000 in the next three years. These will be matched dollar-for-dollar by the States.

To make it possible to speed up the rate of completion of the Interstate System, a provision was included which permits States to proceed to construct projects without the use of Federal funds under the condition that payment of the Federal share of the project will be made later. However, all procedures

and all requirements applicable to similar projects must be satisfied.

Funds are also made available under this new legislation for the advance acquisition of rights of way. The provision of the law concerning the relocation of utility facilities reads as follows:

"(a) AVAILABILITY OF FEDERAL FUNDS FOR REIMBURSEMENT TO STATES.—Subject to the conditions contained in this section, whenever a State shall pay for the cost of relocation of utility facilities necessitated by the construction of a project on the Federal-aid primary or secondary systems or on the Interstate System, including extensions thereof within urban areas, Federal funds may be used to reimburse the State for such cost in the same proportion as Federal funds are expended on the project: Provided, that Federal funds shall not be apportioned to the States under this section when the payment to the utility violates the law of the State or violates a legal contract between the utility and the State.

(b) UTILITY DEFINED.—For the purposes of this section, the term "utility" shall include publicly, privately, and cooperatively owned utilities.

(c) COST OF RELOCATION DEFINED.—For the purposes of this section, the term "cost of relocation" shall include the entire amount paid by such utility properly attributable to such relocation after deducting therefrom any increase in the value of the new facility and any salvage value derived from the old facility."

Another provision stipulates that all "laborers and mechanics" employed by contractors and sub-contractors on interstate highway construction projects shall not be paid less than the prevailing wage rate in the immediate locality. The Secretary of Commerce is directed to collect facts to aid the Congress in determining whether or not the Federal Government should reimburse any State for the cost of any highway construction project (whether toll or free) on the Interstate System which has been initiated or completed during the period August 2, 1947 to June 30, 1957. The Secretary of Commerce was also directed to make a study to determine what type of action may be taken by the Federal Government to increase highway safety.

An emergency fund of $30,000,000 was created for the repair of highways and bridges on Federal-aid highway systems which have suffered damage as a result of a disaster, as by floods, hurricanes, etc. The Federal share shall not exceed 50 percent of the total cost.

Hall Named Prexy of Georgia Chapter

Gainesville, Georgia—At the recent meeting of the Georgia Chapter, President John W. Ball, Sanitary Engineer of Atlanta, presided. Riley Milam, City Manager of Gainesville was General Chairman of the meeting but the official family included Mayor P. H. Chapman, and Commissioners R. M. Knickerbocker and C. J. Thurmond. Mr. Milam started the meeting in a humorous vein by saying that every effort should be made to "Give the Public the Works!" The opening session included a talk by Arthur A. Mendonsa, Planning Director for Gainesville and Hall County: "Preventive Action—the Hope of Cities"; and another on street construction by Pierre M. Kimball, of the American Bitumuls and Asphalt Company. This was followed by a demonstration of rescue equipment by members of the City Fire Department under the direction of Chief R. E. Spence. Members and their guests then enjoyed a complimentary

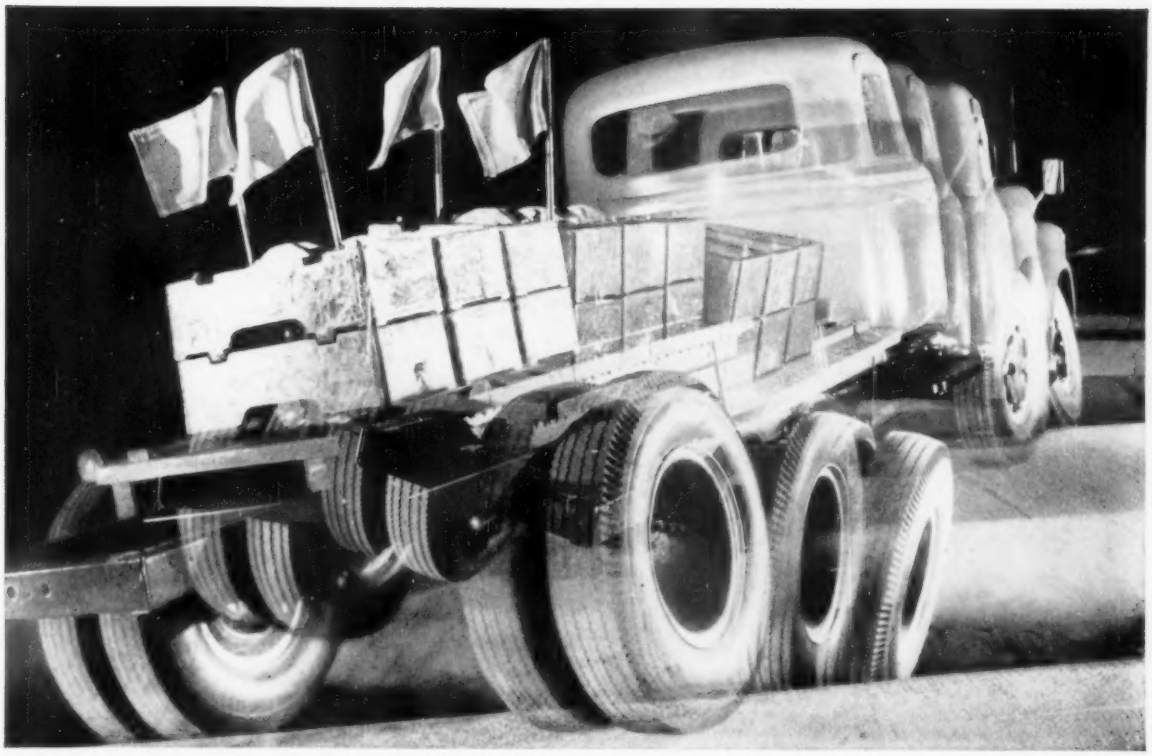
luncheon on Hall County and the City of Gainesville. The afternoon program consisted of a tour of Buford Dam and a review of a display of equipment. Charles A. Jackson, Resident Engineer on the Buford Dam project for the Army Corps of Engineers said that the Dam will increase the water supply for municipal and industrial uses in the Atlanta area and provide excellent recreational sites. It will impound runoff waters from over one thousand square miles into a large irregularly shaped lake with 670 miles of shorelines.

A Fellowship Hour sponsored by the Atlantic Engineering Company preceded the annual banquet which featured George Dempster, Sr., of Knoxville, Tennessee as the guest speaker. L. N. "Red" Hall, Superintendent of Sanitation of Albany was elected President and Grady Young, Sanitary Inspector of Atlanta was named Vice-President. The Directors include Riley Milam, City Manager, Gainesville; R. N. Allred, Superintendent of Motor Equipment, Columbus; R. M. Hadley, Director of Public Works, LaGrange; and B. C. Wallace, Chief, Sanitary Department, Marietta, Georgia. The chapter retained the services of Past President John W. Ball, by electing him to the post of Secretary-Treasurer.

The second day's program included a talk on "Sanitary Land Fill Methods in the United States" by Cadet Jimmie V. Thurmond, Jr., of the Virginia Military Institute; a talk by M. A. Cochran, Supervisor of Research for the Atlanta Sanitary Department, on "Planning for Efficient Garbage Collection"; and another by George F. Burke of Atlanta titled—"What the Food Waste Disposer Can Do for Your City". T. M. Etheridge, Superintendent of Sanitation, Columbus; Robert D. Speer, Sanitary Engineer of Atlanta; and President-Elect "Red" Hall of Albany then served as a panel of experts to discuss a number of questions concerning refuse collection problems.

Poll Shows Public is Fed Up With Litterbugs

New York, New York—The American people are "fed up" with littering and want something done about it. This is the conclusion of a nation-wide public opinion poll just completed by the Gallup organization. How seriously the American people regard the growing litter problem may be judged from the fact that 86 percent stated categori-



3-foot ditches! 8 per trip! Trip after trip! This "Twist Test" on our proving ground really puts a truck through the wringer. It wrenches engine mountings, frame, springs, cab alternately in opposite directions—puts a strain on every part to check for maximum endurance. If new designs or parts are going to fail, they'll fail right here. Torture like this on the test track saves you the BIG money on the job.

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cally that litterbugs should be fined—to the full extent of the law. People reached by the poll comprised a typical sample of adult Americans in all sections of the country. Opinion appeared to be nearly uniform between men and women and among all age groups and regions. The survey was conducted on behalf of Keep America Beautiful, Inc. In releasing these survey results, Keep America Beautiful, Inc., pointed out that more than forty states now have anti-littering laws in effect. However, the problem is not solved by the mere passage of laws. Enforcement of the existing provisions against littering is an almost superhuman task, considering the countless miles of highways, beaches, parks and other public areas which are subject to litter.

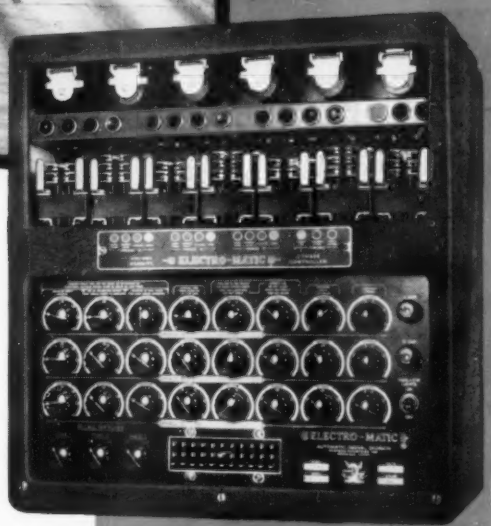
APWA Issues New Specification for Concrete Pavements

Chicago, Illinois—A revised edition of APWA Specification F—Portland Cement Concrete Pavements—is now available from the headquarters of the American Public Works Association in Chicago. The 24-page specification was prepared by a committee headed by Edwin H. Pate, City Engineer of Lincoln Park, Michigan, to serve as a guide to public works engineers who are responsible for the drafting of contract specifications. It is one of the series of standard specifications published by the Association and is priced at $1.00 per copy. Other members of the Committee who helped to prepare this specification were: Robert Werner, Chief, Division of Engineering and Construction, Columbus, Ohio; James Robertson, Assistant City Engineer, Seattle, Washington; Arthur Darlow, Director of Engineering, Miami, Florida; Leo Arms, Manager, Highway and Municipal Bureau, Portland Cement Association, Chicago, Illinois; James H. McKay, Engineer of Highways, Baltimore, Maryland; and J. O. Armstrong, Consulting Engineer, Kansas City, Kansas.

New England Chapter Holds Annual Meeting in Providence

Providence, R. I.—The second annual meeting of the New England Chapter of the APWA was held on June 12, 1956, at Providence, R. I. Over 100 members and guests attended the meeting which featured four informative talks. The first speaker was Lt. Col. J. Wachendorf, of the U.S. Army Corps of Engineers who spoke on the subject: "Federal Flood Control in New England"; Joseph Vallone, Director

55,000 Vehicles per day



MODEL 1033
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Baltimore's busy Park Circle handles 55,000 vehicles in an average day on six converging approaches. The problem is intensified because of heavy reversals of directional flow and fast developing peaks. Add the seasonal traffic to and from Maryland's famed Pimlico Race Track, the burden of feeder routes to rapidly growing residential sections, and you have the elements of a real problem intersection.

Write for Bulletin C-115-B

It takes a 1033 to handle the really tough ones!

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NORWALK, CONNECTICUT

of Public Works for Rhode Island discussed "Rhode Island's New Highways"; he was followed by Walter H. Brown, Project Engineer, BIF Industries, Providence, whose topic was "How to Select and Use a Consulting Engineer"; the last speaker was Walter Shea, Chief, the Sanitary Engineering Division, Rhode Island State Health Department, whose subject was "Progress in Rhode Island Water Pollution Abatement."

Those in attendance were treated to a buffet luncheon by the City of Providence, viewed an equipment exhibit and made an inspection trip through the City's sanitation garage and incinerator, the highway garage and the chemical plant of the Fields Point Manufacturing Company.

Howard F. Carpenter, Chief of Sanitation of Providence, was elected President of the chapter at the annual business meeting. George J. Maher, Director of Public Works, Lewiston, Maine, was named Vice-President and Lyman C. Lovell, Director of Public Works of Hartford, Conn., was elected Secretary-Treasurer. Named to the Executive Committee were: Timothy J. O'Leary, Superintendent of Sanitation, Boston; Charles W. Cooke, Executive Director, Park River Flood Control District, Hartford; Robert B. Strong, Chief, Construction and Maintenance, Providence; and Wesley E. Haynes, Superintendent of Public Works, Concord, N. H.

APWA Research Foundation Surveys City Research Needs

To determine what types of research projects are now being undertaken by municipalities, the APWA Research Foundation, through APWA Headquarters, has sent letters to cities of more than 50,000 population. One purpose of the survey is to explore the possibility of correlating research efforts on problems of common interest to public works officials. Another objective is to determine the extent to which the Research Foundation can assist in helping to organize, and can advise on financing, needed scientific investigations of public works problems facing local governments.

In order to standardize, so far as possible, the information obtained from cities, a research proposal form has been prepared and sent with the letters. Additional copies of these forms are available from APWA Headquarters. Since funds for actual research must be obtained from outside sources, and since work is normally carried on through colleges and universities, considerable and detailed information is necessary.

The specific aim of the project must be stated clearly and concisely and its significance to the public works field indicated. Other information normally necessary for consideration of any research project includes: Methods of procedures as planned for the project, in some detail; the estimated time required for completion; the research staff required, including special qualifications and skills; the facilities required and available; and the budgetary needs, including personnel, equipment, consumable supplies, travel and other costs. For each of these, the funds requested and those available from other sources must be stated. An essential portion of the form, necessary to avoid duplication of research effort, is a statement of previous research work done elsewhere on the general subject.

It is felt that the greatest service the APWA Research Foundation can render is to provide guidance and to encourage research in areas in which the APWA is the only agency in-

volved. However, there are numerous research projects which may best be carried out in cooperation with other interested organizations, though these projects may have also a special application to the public works field.

• • •

Air Pollution Control Developments in Los Angeles County

Four new rules affecting air pollution control in the Los Angeles Basin have been submitted to County Supervisors or are in the study stage. Rule 11, exempting certain innocuous processes and equipment from requiring permits, and Rule 40, establishing a fee system for permits, were presented to the Board in June, preliminary to a public hearing. Rule 62, requiring installation of vapor recovery systems at service stations with tanks under 20,000-gallon capacity, is being completed. Rule 19, requiring owners of industrial equipment which emit pollutants to install testing equipment for convenience of air pollution engineers, is being studied. Rule 62 is an extension of Rule 61, passed earlier this year, which requires control on bulk loading stations with gas tanks in excess of 20,000-gallon capacity. The new rule will remove an estimated 24 tons of smog-forming hydrocarbons from the atmosphere daily. All rules are the result of a stepped-up program to achieve more effective and efficient over-all air pollution control by the Air Pollution Control District of Los Angeles County.

• • •

Spectrophotometer Helps in Wastes Analyses

A DK model Beckman spectrophotometer is used by the Sewage Disposal Section of Cincinnati, Ohio, for special analyses of all samples handled by the Section. This instrument automatically and continuously records in the ultraviolet, visible and near infra-red (up to 2.8 microns) spectral regions.

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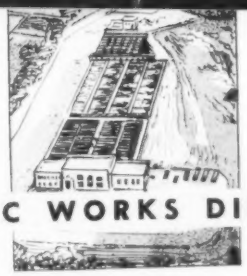
Requirements for a Special Industrial Zone

Special industrial zones in Hartford, Conn., provide for area setbacks, off-street truck loading, off-street parking and other factors; and prohibit residential construction, retail stores and service establishments, except under special conditions.



PUBLIC WORKS DIGESTS

THE SEWERAGE AND REFUSE DIGEST

Syndets in Activated Sludge Treatment

The authors studied the interaction of ABS (the main type of syndet used in household synthetic detergents) in activated sludge treatment by using radioactive ABS and tracing its passage through the process. They concluded that activated sludge treatment can, under some circumstances, remove most of the ABS present in normal sewage. The conditions necessary were not determined, but a high D.O. concentration in the mixed liquor is known to promote increased oxidation.

"Radioactive A.B.S. in Activated Sludge Sewage Treatment." By Ralph House and B. A. Fries, of Calif. Research Corp. *Sewage and Industrial Wastes*, April.

Liquid Digested Sludge Used as Fertilizer at Wadena

Wadena, Minn., population 5,000, constructed in 1925 a treatment plant with Imhoff tank and trickling filter. In 1955 the plant was modernized, using the old trickling filter as a finishing filter and the Imhoff tank as a secondary digester. The new features include a comminutor, primary clarifier, high-rate filter, intermediate clarifier the sludge from which flows to a wet well. Effluent from the intermediate clarifier flows to wet well No. 2, from which a portion is pumped to the old standard-rate filter and another portion to the high-rate filter. Sewage flows by gravity from the finishing filter to a final clarifier and thence to wet well No. 1. A fixed-cover digester has a capacity of 4 cu. ft. per capita (based on design capacity of 10,000 equivalent population), which is heated to 90° by a thermostatically controlled heat-exchanger. Overflow from the digester goes to a secondary digester. Sludge from this flows by gravity to a tank truck and is hauled away for fertilizer, used almost entirely on the municipal airport, but a number of farmers are anxious to obtain it. The raw sewage flow is measured by a Parshall flume of sheet metal grouted in concrete; when the metal corrodes, the concrete will remain as a flume.

"High-Rate and Low-Rate Filters Provide Excellent Effluent." By Lester Lee, Consulting Engineer. PUBLIC WORKS, July.

Bound Water And Sludge Bulking

A good activated sludge will settle to a concentration of only 1% solids. Bulky activated sludge is characterized by a large volume and poor settleability and its water-binding capacity deserves consideration. A study was made by a "research forum" of the Federation of Sewage and Industrial Wastes Associations. This study led to conclusions which include the following: The bound water content of a zoogleal type of bulky activated sludge is higher than that of a sludge with a low sludge volume index. Chlorination of this type of sludge gave an immediate decrease in sludge volume index and bound water. The increase in bound water and the increase in the sludge volume index are considered to be associated phenomena, the result of biochemical processes induced by excessive supply of available food in relation to the number of organisms (amount of sludge in aeration tank). The results of this study do not indicate that the dissolved oxygen or nitrate content of the aeration tank are responsible for or are symptomatic of bulking.

"Bound Water and Activated Sludge Bulking." By H. Heukelekian and E. Weisberg, of Rutgers Univ. *Sewage and Industrial Wastes*, April.

Federal Aid For Sewage Works

On May 9th a group of representative men interested in abatement of stream pollution met at the invitation of Engineering News-Record to discuss the question whether and under what circumstances they considered federal aid for sewage works desirable. The conferees included water works officials, engineers of state boards of health, representatives of the Federation of Sewage & Industrial Wastes Associations and of the American Municipal Ass'n, prominent sanitary engineers and Dorr-Oliver, Inc. Most if not all were in favor of federal aid under some conditions, but some thought that their conditions would be difficult to impose. The chief objection was that the possibility of obtaining aid would lead many cities to defer installing treatment plants or entirely eliminate any efforts in that direction. One speaker said that, while some communities needed aid, they were all small ones and the pollution they would contribute would be less than that caused by the delays of large cities due to the hope of federal aid.

"Federal Aid for Sewage Works." *Engineering News-Record*, June 7.

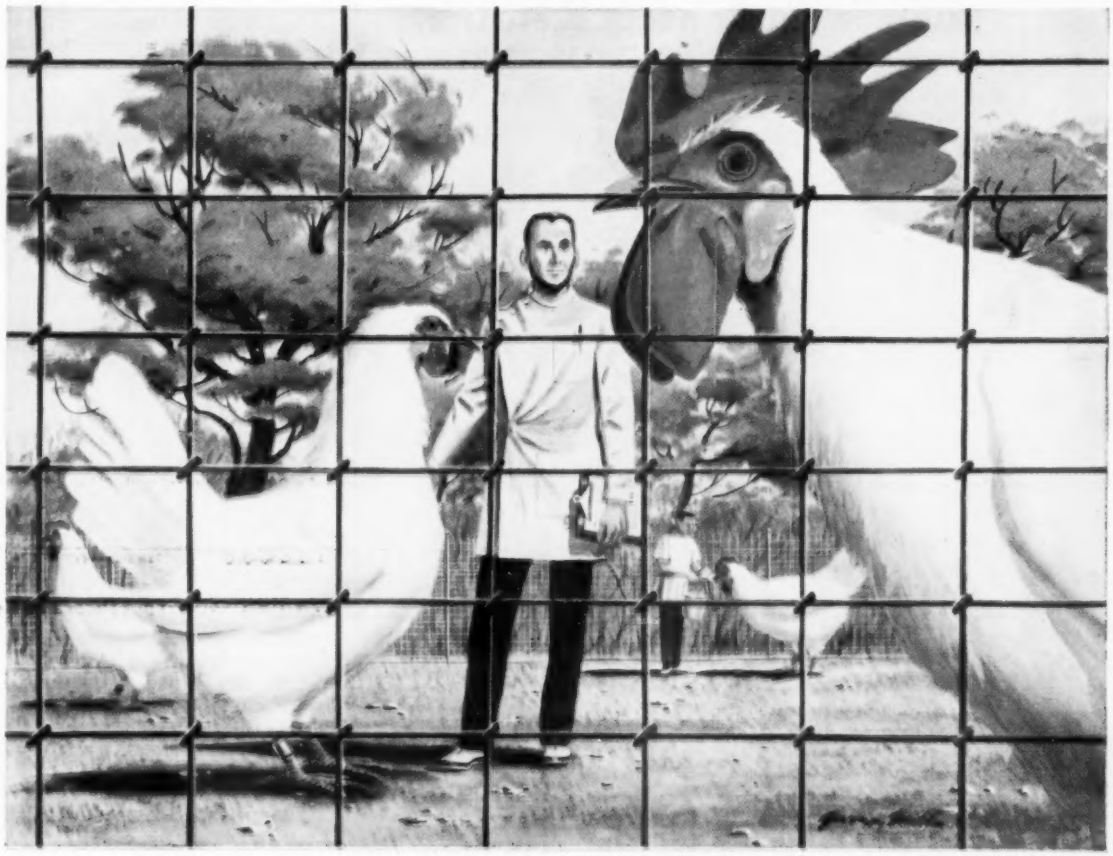
A Review of 1955 Literature

The annual review of literature on sewage, waste treatment and water pollution, which is a standard feature of Sewage and Industrial Wastes, is more extensive this year than ever. It contains 113 articles on Analytical Methods; 144 on Sewage; and 149 on Radioactivity. These appear in a first installment published in the May issue. A second, published in the June issue, dealt with Industrial Wastes, 311 references; and Water Pollution, 221 references. The digests of these articles, more than 800 in number, occupy about 65 pages of the Journal.

"A Critical Review of the Literature of 1955 on Sewage, Waste Treatment and Water Pollution." By Committee on Research, FSIWA; H. Heukelekian, Chairman. *Sewage and Industrial Wastes*, May and June.

Sludge Elutriated And Dried in Basins

The city of Wilmington, Delaware, and the surrounding New Castle County have constructed a treatment plant to serve an existing population of about 250,000, which is self-sustaining by means of service charges. Only primary treatment is required by the "Incodel" Commis-



By changing the character of hormones and genes science may increase tremendously the size of fowl and domestic animals . . . put more meat at less cost on the American table.

100 years from now...

WE MAY RAISE CHICKENS AS BIG AS OSTRICHES!

How will we live, eat, travel in the future? Even scientists must include some guesswork in their predictions of the marvelous things to come. But one thing seems certain—water and gas will still be carried by the dependable, long-lasting cast iron pipe laid today. Here's proof! More than sixty American cities are still being served by cast iron water and gas mains over a century old. And today's modernized U. S. Pipe... centrifugally cast, quality controlled . . . is even stronger, tougher, and more durable.

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sion. Clarifiers give a detention period of 2.2 hr. and the unchlorinated effluent flows into the Delaware River. The sludge is elutriated with river water to thicken it and wash out any toxic compounds and passes through heaters to digestion tanks with a capacity of 2 cu. ft. per capita. Temperature is maintained at 90° to 95°. The digested sludge is pumped to 8 large open basins, the excess water from which is decanted back to the clarifiers. These basins, located on inexpensive land adjacent, have capacity to hold all the sludge produced by more than 10 years before removal of sludge will be necessary. The sludge discharged to the basins in August, 1955, when the plant went into operation, averaged 9.3% solids.

"The Wilmington, Delaware Sewerage System." By Roy H. Ritter. *Sewage and Industrial Wastes*, April.

Checking Effluent Dispersion With Radioactive Tracers

Engineers who are designing the Hyperion Treatment Plant of Los Angeles, Calif., in an effort to determine the dilution and rate and direction of diffusion of sewage discharged into the ocean, mixed a radioactive material—Scandium-46—with the plant effluent, and scientists aboard a laboratory ship took radioactive measurements at various depths and positions, over an area of 25 sq. mi. Before selecting Scandium-46 for this purpose, 21 substances were studied.

"Using Radioactive Tracers to Check Dispersion of Sewage Effluent." PUBLIC WORKS, July.

Sanitation in Fringe Areas

Methods of handling the problem of disposing of domestic sewage in small communities and residences remote from municipal sewerage systems in New Jersey, Kansas, Missouri and Florida are described by several engineers. The New Jersey legislature in 1954 enacted a law providing that no building permit for the construction of a realty improvement shall be issued by any municipal authority until the board of health having jurisdiction shall have certified that the proposed water supply system and sewage facilities are in compliance with the provisions of the law requiring submission of a formal application, accompanied by engineering data, for certification by the local board of health. A committee is appointed by the state health department to develop standards for subdivision de-

Road and park maintenance. The Universal 'Jeep' with grader or dozer blade demonstrates its versatility on road maintenance and grading as well as many other jobs. With the extra traction of its 4-wheel drive and special low gear range, it's a workhorse that helps keep work moving every day in the year. And with snow blade, it keeps roads, driveways and parking areas open.

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velopments. One requirement of these is that "Individual sewage disposal systems shall not be designed, constructed or located in a manner that will permit the discharge of an effluent onto the surface of the ground or into any watercourse.

In Kansas the only practicable method of preventing unsanitary conditions seems to be by voluntary organization of districts by county commissions, township boards, petition of owners of more than 10% of an area or by more than 500 electors. Operation of such systems may be by home owners' association, or nonprofit sewer corporation. Encouragement of citizens to organize such districts is provided by local health departments, planning boards and local clubs. Newspaper and radio publicity are important mediums.

In Florida, prior to 1946, there were about 250,000 homes served by septic tanks and drain fields; at present there are probably more than 500,000. But the majority of the population is on land not more than 25 ft. above sea level and in rainy seasons many of the drain fields are flooded; and even on high land the soil becomes saturated. Realizing this, developers of subdivisions have been persuaded by the state board of health to provide privately owned water supplies and sewerage systems with treatment plants. More than 100 of these are now in operation. The board cannot compel developers to provide them, but convinces them that the higher prices received for lots in such developments make the practice financially profitable. In general, the subdivision treatment plants rate equal to or better than city plants of comparable size.

"Fringe Area Sanitation—A Symposium." By John E. Kiker, Jr., Prof. of Civ. Eng., Univ. of Fla.; I. Russell Riker, San. Eng., Princeton, N. J.; Myron K. Nelson, Chf. Eng., Mission, Kansas, Sewer Dist.; Dwight F. Metzler, Chf. Eng., Kansas State Bd. of Health; and John W. Wakefield, of Fla. State Bd. of Health. *Sewage & Industrial Wastes*, April.

Controlling Filter Flies

The Vector Control Section of the Dallas, Tex. Public Health Dept. has conducted an investigation of methods for controlling filter flies other than flooding. They found that the two common species of filter flies, *psychoda alternata* and *telmatoscopus albipunctatus*, could be controlled by adding a low concentration of effective larvicide continuously for 2½ or 3 hours to the sewage going to the filter, or a high concentration for only 1 or 2 minutes, preferably the latter. Good larvicides found by test were mixtures containing an organic phosphate and a chlorinated hydrocarbon. Two such mixtures are known as Psycon and Malrin. In test made in summer, 809 ppm of Psycon gave a control of 99.85% and 919 ppm killed all larvae. In December the percentage was below 70. Worms and snails were not affected. Weekly treatments may be necessary in extreme cases.

"Controlling Sewage Filter Flies." By Ernest W. Laake, City Entomologist. PUBLIC WORKS, July.

Right of Industries To Use Municipal Sewer Systems

No one has a vested right to use a city's sewer system, nor can a city grant such right. It may grant licenses or permits to connect with and use its sewers, contingent on the ability and capacity of the system and plant to dispose of the licensee's sewage. It is the city's right and duty to protect its interests by passing and enforcing ordinances necessary for this purpose.

"Discharge of Industrial Wastes Into Sewerage Systems; Legal Aspects." By John T. Morrisey, Gen'l Counsel, League of No. Carolina Municipalities. PUBLIC WORKS, July.

Other Articles

"Sewer Inspection Tool" permits easy location of water inlets, breaks, etc. By John H. D. Blanke, Chairman Sewer Comm., Barrington, Ill. American City, June.

"Sewerage in 1955" in England. Annual review. The Surveyor, May 19.

"New Analysis Pinpoints **Detergents** Present in Water and Sewage Plants." Engineering News-Record, June 7.

"Characteristics of **Refuse in National Parks.**" Data from three parks. By Malcolm C. Hope and Leo Weaver, of Div. of San. Eng. Public Works, July.

"Recent Developments in the **Control of Stream Pollution"**, since 1927. By B. A. Southgate and A. L. H. Gameson, of the English Water Pollution Research Lab. The Surveyor, May 26.

"Sanitation, Hydrology and **Nuclear Devices.**" The problem of nuclear wastes. By Edward R. Hermann, research engineer, Univ. of Texas. Public Works, July.

"Comparative Evaluation of Special 2-Day and Standard 5-Day **BOD Tests.** Errors of 5 to 10% were observed for the 2-day tests, and 20 to 25% for the 5-day. By William L. Tidwell and J. H. Sorrells of Eng. Experiment Sta., Texas A&M College. Sewage and Industrial Wastes, April.

"Combustible Rubbish Collection and Disposal Program for Los Angeles." Public Works, July.

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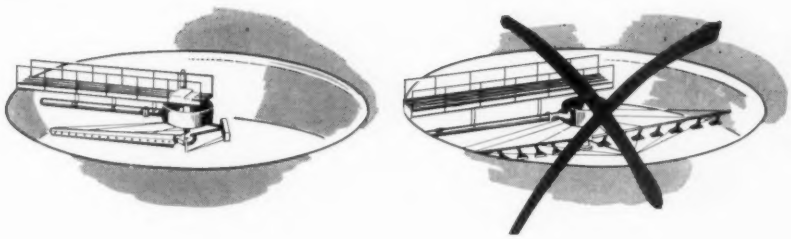

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Automatic Controls Limit Carbon Monoxide Concentrations in Tunnels

MOTORISTS using the six-block underpass beneath the United Nations Building in New York City are protected from the hazards of carbon monoxide by a mechanical watchman that continuously and automatically samples and tests the air in the tunnel.

City ordinances limit the amount of carbon monoxide permissible in covered vehicular thoroughfares. In some cases it is necessary to operate large ventilating fans constantly to prevent dangerous concentrations of CO. At the UN Building, however, the exhaust fans serving the underpass operate only when the carbon monoxide sampling and analyzing system indicates that the CO concentration is approaching an undesirable limit, thus cutting power and maintenance requirements on the ventilating fans.

Air samples from four zones are led to a carbon monoxide recorder system, a development of the Mine Safety Appliances Company. Here the CO concentrations are determined. If the concentration in any sample reaches a preset level, an electrical relay automatically actuates the circuit for the ventilating fans, each of which is powered by a 25-hp motor. Should the concentration of CO continue to increase and reach a second predetermined level, an alarm horn sounds and a signal light on the instrument panel indicates which sampling zone is affected.

● PANEL of the carbon monoxide test system guarding underpass beneath the UN Building in New York City. Recorders at left show analyses at four sampling zones.

Comminutor installation serves 7 years with only routine maintenance

In Madison-Chatham Sewage Treatment Plant, money saved by low installation and maintenance costs helps pay for Worthington comminutor and other public works.

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So says Ed Molitor, Plant Superintendent, about the 25-inch comminutor in service at Madison-Chatham, N. J., Joint-Meeting Sewage Treatment Plant.

Mr. Molitor isn't alone in his opinion of the rugged Worthington comminutor. We've had similar reports wherever they're used—and that covers the country.

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PUBLIC WORKS DIGESTS

THE WATER WORKS DIGEST

Automation In Water Works

Automat (ic operat) ion is rapidly becoming general in water works, and embracing more operations. The adoption of automatic devices by operators would be more general but for what Secretary Harry Jordan calls the "fear complex"—fear that it will replace man power and cost too much. As to the latter, it will eliminate human mistakes that cost more.

An automatic control system must include a sensing element, transmission system, instrument or comparer unit, control unit, and power to do the work. In water treatment involving stepwise unit processes, complete automation is best accomplished by cascade or "piggyback" control. This system forms a series of linked control systems, each controlling within its link, while the material being processed feeds into successive operations. This cascade system can be built up stepwise to cover the entire operation of an automatic water plant. Many sensing elements have been in use for years —to measure temperature, pressure, fluid flow, pH, oxidation-reduction potential, and conductivity; also residual chlorine, turbidity, and dissolved oxygen, but improvements in the last three are needed. We also need new devices for determining optimum point of coagulation, filterability of water, fluoride content, hardness, chlorine demand, bacterial content. The sensing devices must be able to convert the sensed information to some physical manifestation represented by mechanical motion, pneumatic pressure, or electrical voltage or frequency.

"Automation in Water and Sewage Works." By B. L. Soscia and R. W. Lindsey, of B.I.F. Industries, Inc. *Water & Sewage Works*, June.

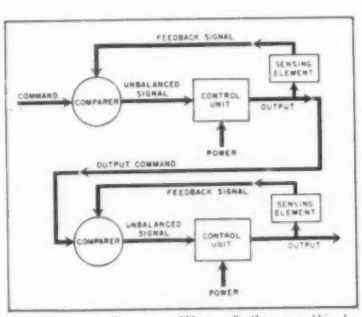
Asphalt Uses On California Reservoirs

The author describes in some detail how asphalt has been used in California reservoirs and canals in the form of asphaltic concrete, asphalt membrane linings, and prefabricated panels. The aim in most cases is to produce imperviousness; but porous asphaltic concrete lining is sometimes used to relieve uplift pressure on drawdown of water level, while preventing erosion of the bank and a smooth surface for cleaning. Prefabricated lining is generally made in panels, about ½ in. thick, 4 ft. wide and up to 25 ft. long, joined with hot asphalt or cold asphalt mastic.

"Asphalt Has Many Uses on California Reservoirs." By Louis R. Hovater, of the Asphalt Institute. *Engineering News-Record*, June 7.

Water Treatment In the Tropics

The author, technical director of a British engineering company which has done much of its work in Africa, Burma, China and South America, describes conditions in tropical countries which affect the designing and construction of works for treating water for potable purposes. Such water supplies are generally surface supplies, usually from rivers. Most of them are soft, some with a high pH value. The high pH waters are very prone to algal troubles, and the gravity filters are covered. In designing, cost of labor, materials of construction and of chemicals must be considered. In one case, better coagulation might have been obtained by the use of activated silica in conjunction with alumina, but all the chemicals would have to be imported from England at a great cost, and a local product, powdered limestone, was used instead of the silica. For treating saline waters, either distillation or ion exchange methods may be employed; the former requires fuel or electricity, the latter requires acid and alkali. The relative availability and cost of these at the plant would be vital considerations in choosing which to adopt.



Courtesy Water & Sewage Works

● **HOW automation can be used in various water works installations.**

Tropical waters are, for the most part, easier to purify than those of temperate climates. The higher temperature of the water gives better coagulation; many of them have pH value at nearly the optimum point for effective coagulation. Most of the surface waters carry large quantities of silt—10,000 ppm suspended solids is not uncommon. Algae troubles are common but do not appear to cause undue taste troubles.

"Water Treatment in the Tropics." By E. Field Reid, of the Paterson Engineering Co. *Contractors Record*, May 2 and 9.

Demineralization of Brackish Water by the Air Force

To obtain potable water for U. S. Airmen located on Matagorda Island in the Gulf of Mexico the only source of supply was brackish water from a deep well. At first two thermocompression units, owned by the Army since 1941, were obtained, reconditioned by the manufacturer, and installed on the island. They proved to be unsatisfactory, and were replaced by a demineralization plant in 1953, which now, with flawless automatic operation, gives more fresh, palatable water than was anticipated. The plant consists of a zeolite softener, a cation exchange unit and an anion unit. These remove 263 ppm hardness, 2140 ppm cations, and 1710 ppm anions, respectively. The bid price for the plant was $27,400; specified capacity 3600 gal. in 12 hr. of operation. For each 1,000 gal. of finished water, a total of 71 lb. of sulfuric acid, 14.6 lb. of common salt and 15.7 lb. of

caustic soda are required. The total cost of these delivered on the island is $2.04 per 1,000 gal. of treated water.

"Demineralization of Brackish Water for Potable Supply at Matagorda Island." By S. Y. Yoseph, Engr., U. S. Dept. of the Air Force. *Jour., AWW Ass'n,* May.

Seven Years of High-Rate Filtration

A number of filters in the Chicago South District Filtration Plant are now in their 8th year of continuous operation in excess of 2 gpm per sq. ft. of filter surface. The author presents a summary of operational data for these filters during this period. From these data he draws the conclusions that water such as that of the Great Lakes can be filtered at rates of 5 gpm and produce a satisfactory effluent. When operated at 4 gpm, filters can be maintained in service 97.9 percent of the time; but the length of filter run will be approximately ½ of that obtained if the filter is operated at 2 gpm. The bacterial efficiency at 5 gpm is equal to that at 2 gpm, but slightly more coagulated material passes through. High-rate filters cost a little less per mg treated but little if any less for operation. They should be introduced only when there is evidence that such rates will not decrease plant efficiency.

"Seven Years of High-Rate Filtration." By John R. Baylis, Engr. of Water Purification. *Jour., AWW Ass'n,* May.

Water Rates Are Too Low

The author thinks that there should be a minimum charge of at least $1.50 per month, permitting the use of 2,000 gal. of water, which should be the maximum amount allowed for a minimum charge. An increase of about one per cent per capita per day paid for water would increase the residential revenue more than 50 percent.

"Rates, Revenues and Rising Costs." By Louis R. Howson. *Jour., AWW Ass'n,* May.

Water for the Thule Airbase

Providing a water supply for our airbase at Thule, Greenland, was a problem. The natives melted ice, but the airbase was 10 or 15 miles from the ice cap, and the ice would have to be melted and the water hauled by truck. It was thought probable that the weight of the ice cap would melt the ice at the bottom, but a well 1,000 ft. deep disproved this. Distilling sea water was very expensive. The source selected was a lake about 5 mi. from the airbase, and holding some 173 mg of water. Although it freezes during the winter, about two thirds of its contents are available for use. A jetty was constructed into the lake to allow for an under-ice intake and a pumping plant placed there, which pumps water to a treatment plant on shore. The chief problem now is distributing the water by means of trucks. These are insulated to prevent freeezing. In sub-zero weather they are warmed by a diesel blowtorch within a flue at the rear of each tank.

"Water Supply for Thule." By Col. Morton Solomon, District Eng'r. *Engineering News-Record,* June 14.

The Magnetic Flow Meter

Equipment used for measuring water and sewage must be accurate, durable, require little care and possess certain fundamental hydraulic characteristics. These requirements are more nearly met by the magnetic flow meter than by

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any device previously developed. The meter is based on the principle that if a magnetic field is generated in one direction and a conductor is moved at right angles to the field, a voltage will be generated which is directly proportional to the speed of the conductor and the strength of the field. In the meter, the conductor is a liquid flowing through a nonmagnetic tube, and the average velocity of flow is determined by means of electrodes in opposite sides of the tube, which transmit voltage signals to an electronic recorder. This meter causes no loss of head. When used for controlling filtration rate it produces less permanent head loss across the filter.

"A Unique Flow Measuring Instrument—The Magnetic Flow Meter." By R. H. Babcock, of the Foxboro Co. PUBLIC WORKS, July.

Reducing Unaccounted-For Water

Pasadena, Calif. has reduced the loss of water between production and consumption from 28.8 percent in 1914 to 6.7 percent in 1955. Part of the losses are called "voluntary" losses, and include water used for main flushing, reservoir cleaning, backfilling trenches and meter testing. Non-beneficial losses include reservoir leakage, evaporation and overflow, main and service leakage, and under-registration of meters. The latter probably do not exceed 3 or 4 percent of the total loss, about 1/3 of which is reservoir leakage. If the leakage from a reservoir in one year exceeds its capacity, corrective methods are employed. All reservoirs are lined with concrete, with copper, rubber or mastic stops at the joints. If the joints leak, they are repaired with rubberized asphalt, coal tar, or Thiokol rubber compound. Several reservoirs have been relined with gunite. Much of the underground leakage is from old riveted steel mains, which are being replaced with cast-iron pipe. However, some of the larger steel mains are being lined in place with portland cement mortar. All underground leaks are repaired as soon as their existence is known. The policy is to remove and renovate each meter once in ten years. All services are metered.

"Reducing the Spread Between Production and Consumption." By Elmer L. Smith, Asst. Chf. Engr. of Water Dept. *Water Works Engineering*, May.

Hydrofluosilicic Acid for Fluoridation

Most recent installations for applying fluoride to water supplies, both large and small, have been engineered to use hydrofluosilicic acid; evidently because it is in the form that most satisfactorily meets the criteria of convenience, cost, safety and effectiveness. The source from which it is obtained is so abundant that availability and price stability are assured; various industries compete for other fluoride compounds, but few use this acid. Sodium silicofluoride is slightly less expensive, but equipment, installation, maintenance and labor costs are so much less when the acid is used as to more than offset this. It can be used successfully by small plants as well as large.

"Hydrofluosilicic Acid for Water Fluoridation." By C. E. Meginnis, of Davison Chemical Co. *Water & Sewage Works*, June.

Other Articles

"Problems in **Estimating Fluorides** in Water." By Harry P. Kramer, Robert C. Kroner and Dwight G. Ballinger, of the Robert A. Taft San. Eng. Center. Jour., AWW Ass'n, May.

"Development of **Private Utility Companies** in Florida" considered a

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PROJECT: Sanitary sewer, Kenilworth & Dean Avenues, Washington, D. C.

ENGINEERS: Sanitary Engineering Dept., Government of the District of Columbia.

CONTRACTOR: J. L. McIlvaine Co., Washington, D. C.

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public benefit. By John W. Greenleaf, Jr. Jour., AWW Ass'n, May.

"Analysis of **Seasonal Water Consumption** in Danville, Ill. By Keith A. Yarborough, graduate student, Univ. of Illinois. Jour., AWW Ass'n, May.

"Pipelines Through Easements." Advantages and disadvantages. By Burton S. Grant, Chf. Engr. of W. W., Los Angeles, Calif. Jour., AWW Ass'n, May.

"Nomographs for the Rapid Analysis of **Aquifer Tests"** to obtain coefficients of transmissibility and storage. By Irwin Remson of U. S. Geological Survey, and A van Hylckama, research specialist. Jour., AWW Ass'n, May.

"Recreational Use of Impounding Reservoirs". Arguments for and against. By Charles A. Dambach, Chf., Natural Resources Inst.; and Merrill L. Riehl, Supt. of Water Purif., Mahoning Valley San. Dist. Jour., AWW Ass'n, May.

"How to **Remove Color** from Water" by use of Floc-Former and Precipitator. By Eskel Nordell, of Permutit Co. American City, June.

"Denver Launches $101-Million Water Project," including 23-Mile tunnel. Engineering News-Record, May 24. Water Works Engineering, May.

Roofing a large reservoir. "Putting a Sunshade on Five Acres of Water" near Las Vegas. Engineering News-Record, May 31.

"Water Supplies in 1955" in England. Annual review. The Surveyor, May 19.

"Accident Reduction by New York Water Dept.," about 60% in five years. By William E. Vincent, Director of Safety, Water Works Engineering, May.

"Diesel-Driven Pumps Reduce Operating Costs" at Greensboro, N. C. Public Works, July.

"Copper Sulfate Aids in **Manganese Removal"** at Rock Hill, S. C. By Howard H. Chambers, Supt., and Robert S. Ingols, Eng. Exp. Sta., Georgia Inst. of Technology. Water & Sewage Works, June.

"Disinfection of the Oxford (N. Y.) Water System" **removes Crenothrix** from mains. By A. G. Wheler, and H. C. Smith, of Fischer & Porter Co. Water & Sewage Works, June.

"Modern Application of **Ion Exchange."** By B. A. Sard, of the Permutit Co. Water & Water Engineering (England), May.

"Parallel Rapid **Sand and Diatomite Filters** Serve as Research Units" for evaluation of operating cost and performance data at Johns-Manville Research and Engineering Center. By G. R. Bell, Sr. Research Chemist of the Center. Water Works Engineering, June.

• • •

Snow Removal at the Detroit-Wayne Airport

Enough equipment is available at the Detroit-Wayne Major Airport to permit clearing all active runways and taxiways in about two hours. There are 31,000 feet of runways 200 feet wide and 15,000 ft. of 75-ft. wide taxiways. Removal of snow from the apron areas requires loading equipment and trucks for hauling away.

• • •

Standby Power For a County Highway Department

North H. Newton, Champaign County Engineer, Urbana, Ohio tells us that they use an AC-AC welder generator made by Hobart Brothers Co. for standby power service. The welding capacity of this unit is 300 amperes at 40 volts. The power output is 8 KW at 60 cycles, single phase. This power may be used as a 110-volt 2-wire single phase current or as 220-volt 3-wire single phase current. This generator will generate one kind of current only at a time. If you are welding, you cannot take off power current. If you are using 110-volt current, it must all be 110 volt current. You cannot get 110-volt current and 220-volt current at the same time. This welder generator is mounted on a four-wheel trailer.

Ways to Overcome Apathy in Civil Defense

EDDY S. BRANDT,
Civil Defense Director,
Evanston, Illinois

APATHY is still the greatest obstacle to Civil Defense, but it can be overcome by sound planning. Too often, just one department has been stressed. During World War II, the warden system was greatly overemphasized to the detriment of other departments. Consequently the block warden organization died before it was fairly launched.

There are as many activities that can be undertaken by Civil Defense as there are likes and dislikes among the average citizens.

Many women and young people can be interested in the Ground Observer Corps when they would not care for warden service. GOC proved its worth in recent tests of watching for unknown planes. Also it gave very definite help in the tornadoes of Central Michigan and other places struck by disaster.

Some young men are fascinated by the work of the firemen; others want to be auxiliary policemen. Some do not like to take up such tasks.

Many high school and even college young men are radio hams and so, if given two-ways radios, they will join that helpful division.

Mass feeding appeals to some women as does a blood count census and a list of blood donors. Associated with that needed work is the enlisting of citizens to enter the Red Cross first aid courses. Assembling a list of nurses is another worthwhile project.

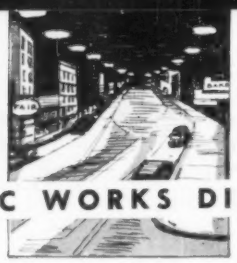
A city official said to me recently, "I am getting too old to be worried about the H-bomb. If it comes, all right. But I am interested in the disaster program because I think we are very lucky if we don't need such a program in the near future."

The high school and eighth grade young people are very easy to interest in Civil Defense. So are the retired people. But the great mass of citizens between these two age groups are the ones who would be most affected and are the least interested.

It is a strange thing that we find it hard to interest serious-minded citizens, yet some easily excited person wants to be a drum major right off the bat. One wanted us to go out and buy a fleet of Cadillacs for the corps.

By taking up all phases of civil defense, you can secure an active minority who are really interested. Adding up in this wise, you get 65 or 70 in the Ground Observer Corps; 35 in the police and the same from the firemen's auxiliary. All in all, if you have catered to a diversified program, you can pick up in a city of 75,000 or 100,000, at least one percent, or nearly 1000 interested volunteers.

This would make a worthwhile nucleus to assist the municipal authorities, the Red Cross and the other affected public relief agencies, such as hospitals, in the case of either war or natural disaster. Such a condensed organization, connected by a "telephone tree" could be called in case of disaster to meet at fire stations or schools for assisting in the work of relief.



PUBLIC WORKS DIGESTS

THE HIGHWAY AND AIRPORT DIGEST

Investment Analysis In Estimating Highway Needs

Research on the growth and depreciation of the investment in highways is relatively new. The basic data for such research are obtained from the road-life study phase of the Statewide highway planning surveys. Some of the initial applications of the findings are very promising. One of these, as discussed in this article, involves the estimating of highway needs.

The end product of a highway needs study is, of course, the formulation of a financial plan to meet such needs. This inevitably requires consideration of many financing alternatives, and in the case of credit financing proposals, requires a year-by-year listing of capital outlays required to reach adequacy within a given time period and thereafter to sustain adequacy. Not only does the investment analysis approach provide a quick means of estimating total needs, but it also provides a method of scheduling such needs on an annual basis over extended future periods.

Research on the investment analysis approach is still in its initial stages. There is, however, one general finding that warrants mention. It has been found that over a 30-year period, the total capital outlay needed to build an adequate highway system and thereafter keep it adequate is about the same regardless of the time taken for the initial catch-up program.

"The Investment Analysis Approach to Estimating Highway Needs." By Fred B. Farrell, Chf., Highway Cost Section, Bureau of Public Roads. *Public Roads*, June.

Coarse Aggregate In Bituminous Mixes

Surprisingly high stability values for bituminous paving mixes containing only 45 percent of coarse aggregate have been found by research engineers of the Asphalt Institute in the first phase of a comprehensive study of bituminous mixes being conducted at the Institute's laboratory. The findings are of a preliminary nature, based on only partial completion of an extensive series of laboratory tests. In making these tests, nine types of coarse aggregates were used. The asphalt cement had 85-100 penetration; the optimum asphalt content ranged from 4.3 percent to 6.8 percent. Throughout all gradation ranges, the coarse aggregates having the more crushed or rough and angular particles indicated the highest stabilities.

"Reduce Coarse Aggregates." *Engineering News-Record*, May 31.

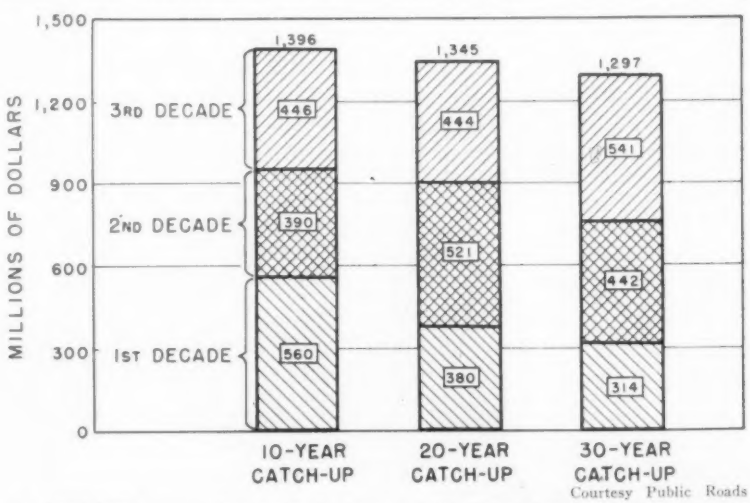
Assessing Benefit Charges

The road code of Montgomery Co., Md., calls for the full cost of new street, sidewalk and storm drainage construction to be borne on a front-footage basis by the abutting property. This is very burdensome on the owners, especially where large storm sewers are to be built. Various alternative methods are being considered: all costs to be borne by the general taxpayers; assessing on a square-foot basis; paying the cost of storm drainage from general taxes or by drainage areas; a flat figure per assessable foot could be set for each type of improvement; or the actual cost could be assessed up to a maximum charge per foot, and the rest paid from general taxes. For Montgomery County, it seems that the best choice lies either in the maximum charge, or in the general taxpayer assuming the costs of installing storm drainage.

"The Front-Foot Benefit Charge." By Jeptha J. Carrell, City Manager, Xenia, Ohio. PUBLIC WORKS, July.

Lives of Highway Surfaces

Records of life experiences of road surfaces on primary rural highways from Jan. 1, 1900 to Jan. 1, 1953 have been studied by the Bureau of Public Roads. From this study they estimate that the number of years a surface remains in service before it is resurfaced, reconstructed or otherwise replaced ranges from 5.2 years for lower-type surfaces to 25.5 years for higher-type surfaces. Of 183,976 miles analyzed, 57 percent had been resurfaced, 31 percent reconstructed, 9 percent transferred to other public agencies and 3 percent abandoned. Since the end of World War II the proportion resurfaced has decreased and the proportion reconstructed has increased. The

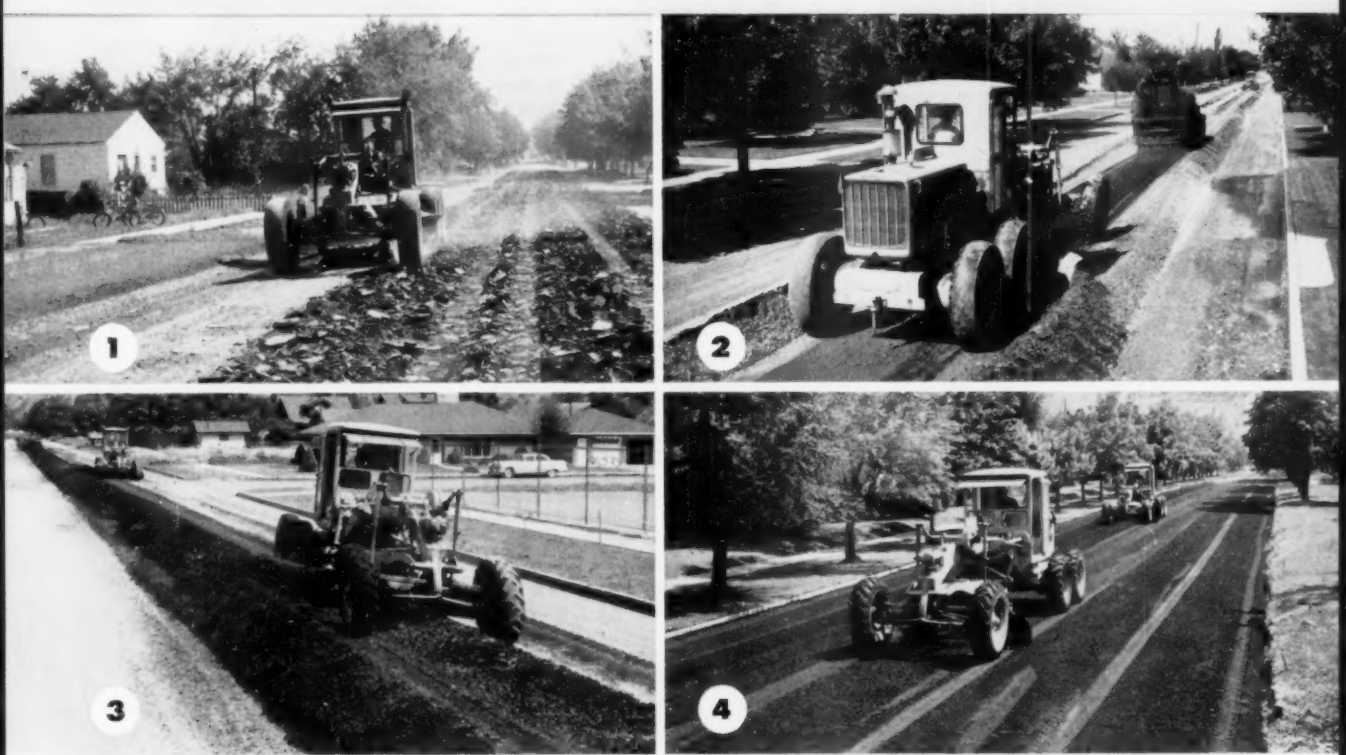


Courtesy Public Roads

● **AVERAGE construction needs in terms of 10, 20 and 30-year catch-up programs for the rural state primary systems of Missouri, Washington and W. Va.**

How City Manager Walton Taylor uses careful planning and CAT* equipment

TO GIVE MISSOULA A NEW FACE



Two No. 12s (1) rip up Missoula's potholed streets...(2) cut gravel from berm to mix with oil...(3) thoroughly work the oil mix...(4) lay mix on improved city streets.

230 miles of streets — too many of them going to potholes. Tight budget — getting tighter all the time. That was the problem in Missoula, Montana. That's the problem in lots of towns. Missoula's City Manager Walton Taylor is licking it with a vigorous 3-point program of reconstructing bad streets, seal coating the good ones, and putting in new drainage facilities. All the while, making every city dollar do 100 cents' worth of work.

Mr. Taylor had bought Caterpillar Motor Graders four times in the past, for other cities. So to help beat Missoula's budget squeeze, he turned to Caterpillar again.

He says, "My experience shows they're more economical, primarily because of the sturdiness with which they're built. They live up to their reputation for handling the hard jobs with no strain, and for taking long hours at low operating cost — with little or no down time." That's why Mr. Taylor has two Caterpillar No. 12 Motor Graders working for him right now.

The No. 12 has always been a cost-cutting machine. Now, two recent money-saving improvements make it a better buy than ever.

New exclusive oil clutch practically does away with disc replacement, cuts down time to the bone.

New tubeless tires eliminate costly tube and flap trouble, can reduce tire down time by 80%.

Its positive controls, clear visibility, fast and accurate blade positioning make the No. 12 easier to operate. Mr. Taylor likes it because it'll carry a full 14-foot blade for maintenance work as easily as a 12-footer. And there are dozens of other reasons why this big yellow 115 HP machine makes an ideal public servant. Let your Caterpillar Dealer give you complete details.

Caterpillar Tractor Co., Peoria, Illinois, U. S. A.

CATERPILLAR*

*Caterpillar and Cat are Registered Trademarks of Caterpillar Tractor Co.

99% OF ALL CAT MOTOR GRADERS EVER BUILT ARE STILL AT WORK

service life data developed were used in estimating the probable mileage remaining in service in future years. It is estimated that, during the ten years Jan., 1953 to Jan., 1963, 96 percent of the low-type, 83 percent of the intermediate type, and 61 percent of the high-type surfaces in service at the beginning of the period will be retired through resurfacing, reconstruction, abandonment or transfer.

"Lives of Highway Surfaces—Half-Century Trends." By Gordon D. Gronberg and Nellie B. Blosser, of Bureau of Public Roads. *Public Roads*, June.

A Three-Layer Runway For an English Airfield

There was constructed recently in England two unusually heavy runways, one 10,500 ft. long by 300 ft. wide, the other 6,300 ft. by 200 ft. Any material of doubtful bearing value was replaced with ballast, and ballast to a compacted thickness of 8 in. was placed over the area. On this was placed a 6-in. slab of lean concrete (1 part cement to 15.4 parts ballast) compacted by 10-ton tandem rollers, with expansion joints at 120-ft. intervals. On this was laid a 12-in. slab of medium quality concrete (1 cement to 8.5 aggregate). On this was laid a top slab 8-in. thick of concrete mixed 1 cement to 7.25 aggregate; giving a total thickness of 26 in.

"Massive 3-Layer Runway Built for English Airfield." *Roads and Streets*, May.

Maintenance Of Runways

In addition to the maintenance required by highway pavements, airfield pavements have problems of their own, including heat, spillage and blast from jet planes. The fuel spillage problem will worsen as aircraft increase in weight, and eventually all military aircraft except cargo carriers will be jet-powered. One of the biggest headaches is keeping airfields free of debris. The cost of repairing jet engines damaged by the injection of loose materials from pavement surfaces, at the depot level only, runs about $18 million annually. Conventional broom-type sweepers are too slow. The only answer is a high-speed vacuum cleaning sweeper that can clean at least 1,000,000 sq. ft. of pavement per hour at speeds of 20 mph or greater. Of all maintenance and construction operations connected with bituminous airfield pavements, seal coating has been given the least consideration. Strengthening existing concrete pavements by adding a thin overlay of concrete well bonded to the old pavement has proved to be an economical and practical procedure.

The above are some of the points brought out at a 4-day conference held May 28-31 by 150 specialists in airfield pavements, including representatives of all major Air Force commands.

"Runway Maintenance Is a Complex Task." *Engineering News-Record*, June 7.

Brick Bus Stop In Rochester, N. Y.

Asphalt at bus stops in Rochester suffers from constant stopping and starting of heavy vehicles, combined with hot sun; also grease and oil drippings soften them. Cement concrete may suffer from the use of salts. For four years the city has used brick at bus stops and has observed no apparent deterioration. Moreover, these readily identify bus loading zones; give a non-skid, smooth surface which the drivers like, and eliminate water splashing on passengers. The use of brick for

New York State Engineers build road in spite of slashed budget. Bitumuls with local aggregate is selected.

WHEN a drastic cut in appropriations forced the New York State Department of Public Works to reduce a project to a minimum expenditure, they turned to the proved method of Bitumuls-Native Aggregate construction. Based on the experience of several of the counties in the region, they knew this to be a sound method of stretching road-building dollars.

Rotary mixer and Bitumuls tank truck work in tandem to stabilize 4" lift of base aggregate.

The original plan

Airport construction at Riverhead, Long Island forced the relocation of the Wading River-Manor Road. As engineered by the State Department of Public Works, plans for this road originally called for two 24 ft. lanes for a length of approximately 6 miles. Financing, through the U.S. Bureau of Public Roads, struck a snag; and drastic economies were required to keep the job alive. In adjusting to the lower appropriation, it was decided to reduce the project to one 24 ft. lane, of a length allowable under the available monies.

New estimates indicated this would amount to approximately 3.16 miles, and invitations based on this distance were put out for bids. These specifications called for an 8 inch stabilized base, with 1" Asphaltic Concrete surfacing.

Job data

Local selected soil, sand, and gravel blended to meet the following dry sieve specifications were used for the stabilized base work on this job.

PERCENT BY WEIGHT PASSING		
Sieve	Specification	Aggregate Used
1 ½" Sieve	100	100
1" Sieve	90-100	84.5
¾" Sieve	60-80	78.3
¼" Sieve	30-50	64.2
#10 Mesh	20-40	50.5
#40 Mesh	10-30	10.9
#80 Mesh	7-8	5.6
#200 Mesh	5-15	3.8
Emulsified Asphalt	5-7%	5.75%

The amount passing the 200 mesh was specified to be not more than one-half the amount passing the 40 mesh sieve.

Aggregate was blended at the pit, approximately five miles from the job site, tested, then trucked to, and spread on, the sub-base. Enough such material for the bottom four inches of the base course was brought in and spread. Bitumuls Emulsified Asphalt, mixing grade, was pumped directly from the transport truck into a Rotary type mixer. This first 4" base course was mixed, rolled, and cured. Aggregate was then brought in for the second 4" course and the process repeated.

Heavy rains encountered

During the construction of the base course, two separate hurricanes interrupted job-progress. Delay was held to a minimum because Bitumuls readily coats damp aggregate, and damage caused by the storm was restricted to exposed areas of the sub-base plus those areas of the stabilized base that were not cured.

Surface course construction

The 8" Bitumuls Stabilized Base was topped with 1" fine aggregate Asphaltic Concrete surface course. Spreading and compaction of this material was accomplished by conventional methods. The surface course was extended 1 ft. on either side of the 24 ft. pavement to provide a degree of shoulder stability. Upon final acceptance, the road was turned over to the town of Riverhead, New York, by the contractor.

median strips gives good visibility; raised ¾ inch above the street surface, they give a tire hum and steering wheel vibration that warn the driver not to cross. Regular bus stops occupy an area 10 ft. wide and 75 ft. long and accommodate two buses. Light buff colored 3½-inch pavers are used.

"Brick Bus Stops." By Kenneth Knapp, City Eng'r. *American City*, June.

Use of Wood For Highway Signs

Since 1918 the Wisconsin State Highway Commission has used wood for highway signs, and made the signs in its own shop since 1925. Between 1930 and 1940, ½-inch thick exterior grade Douglas fir plywood was used, but the dense, smooth surface of the summer wood retained less paint than the softer spring and sap wood. About 1940 the shop developed a heavy prime coat paint which eliminates differential weathering effects. The state purchases plywood in carload lots and cuts it to the desired sizes. Recent prices per 1,000 sq. ft. for regular exterior grade were $131 for ⅜-in.; $173.47 for ½-in., and $225.19 for ¾-in. For high-density overlaid plywood the prices were about $150 more. To overcome the problem of grain, surface unevenness and difficult paintability, the surface plies may be made of soft wood with fine even grain; or the surface may be covered with a finely ground wood paste bonded to the plywood with a resin, or with paper impregnated with resin.

"38 Years of Wooden Signs." By Wayne N. Volk, Engr. of Traffic Service. *Better Roads*, May.

$12,000,000 Test Road to Be Constructed

Construction is about to begin near Ottawa, Ill. on a test road designed for studying the effect of various truck weights on asphalt and concrete pavements and on bridges. The findings will become the basis for future design, and probably of taxation of the trucking industry. The test road will consist of 8 miles of 4-lane divided pavement. Four test loops, each approximately 7,000 ft. long, will be provided, each loop having two test lanes, one of concrete and the other of bituminous pavement of various thicknesses and designs. They will be tested for two years under loads of 10,000 to 30,000-lb. single axle and 20,000 to 50,000-lb. tandem axle. Various electronic and mechanical instruments will be installed to record the effects of repeated loadings, and high-speed electronic computers will be used to analyze the data. The project is being financed by all but one of the state highway departments, the Bureau of Public Roads, Department of Defense, Automobile Manufacturers Association and others interested.

"Work Begins Soon on AASHO Test Road." *Roads and Streets*, May.

Research on Roadside Vegetation Cover

A report has been issued by the Landscape Bureau, New York State Dept. of Public Works, giving conclusions from an exhaustive study aimed to determine the most economical methods of establishing and maintaining vegetative cover on roadsides. The report notes that highway construction operations often result in greater variation of soil conditions affecting plant growth within a single project than those that occur naturally in wide-scale geographic variation. For establishing a good vegetative cover, the use of top soil is not necessary; it can be attained in virtually any soil by proper lim-

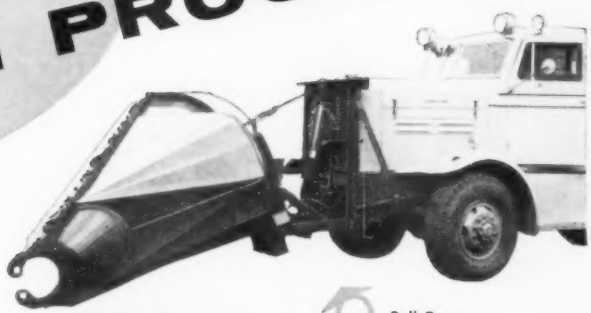
FRINK

PIONEER IN PROGRESS

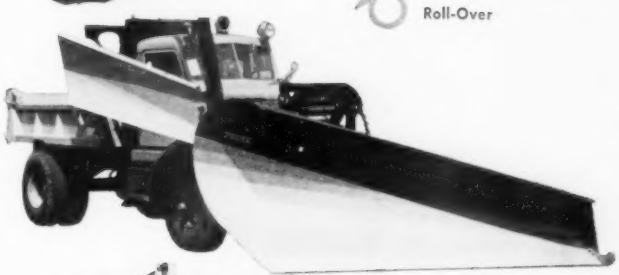
Since Carl Frink made the first all-metal snow plow at Clayton, New York, 36 years ago, Frink Sno-Plows, Inc. has been foremost in the industry. Farsightedness and the courage to be the leader have always motivated every major improvement or innovation in design.

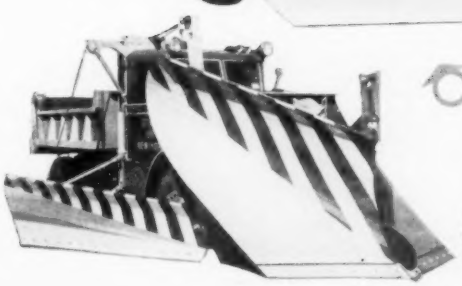
The name FRINK on a snow plow means that years of pioneering research have preceded the plow's manufacture, and only after the new model has had the severest tests under actual conditions does a plow become available for public sale.

Proof of leadership is the fact that down through the years these snow plow developments have been copied by the rest of the industry, but Frink pioneering always stays ahead.



Roll-Over

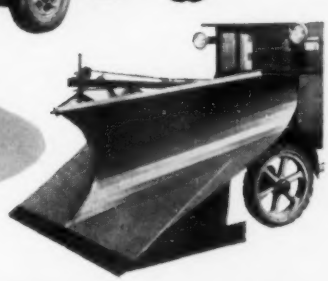




One-Way

V-Type

Reversible



Here is one of the first "shovel nose" V-Type plows made of steel at Frink's—even then, as now, the leader of the industry.

FRINK SNO-PLOWS
REG U S PAT OFF

FRINK SNO-PLOWS, INC., CLAYTON, NEW YORK
FRINK SNO-PLOWS of CANADA, LTD., TORONTO, ONT.

ing and fertilizing. Subsoil conditioned by fertilizing has the advantages over imported top soil of much lower cost and lower content of weed seeds. Successful grass stands were obtained with soils containing as little as 0.5 percent organic matter. Once the grass is established, it generates its own organic matter in the soil. Incorporation of organic matter into the soil is not essential for the establishment of turf except under very unusual circumstances. On sands, mulches and amendments are generally required; inorganic amendments being generally less expensive and equally as effective as the organic types. Recommendations are given regarding the selection and use of fertilizers; seedbed preparation and seeding methods, choice of grasses; and maintenance, mowing, herbicides, etc.

"Final Research Published on Roadside Project." *Roads and Streets*, May.

Seismic Surveys For a Massachusetts Highway

In preparing quantity estimates in planning the 123-mile Massachusetts Turnpike, the bedrock surface was found, by borings, to be so very irregular that it was decided to supplement the borings with seismic surveys. These were run along the center line and approximately 50 or 60 ft. to the left and right of it. Ordinarily seismic spreads 200 ft. long were set out, the first geophone of each spread coinciding in position with the last geophone of the previous one. This gave a continuous profile of the rock surface along each line. At present a major part of the excavation has been completed in the areas of seismic surveys and "results have been satisfactory." Generally speaking, the boring data checked with the seismic data within 2 ft., and some places within 2 in. At two bridge sites, seismic data were obtained under water to give the rock profile across the river.

"Seismic Profiles Speed Quantity Estimates for Massachusetts Turnpike." By Vincent J. Murphy, Geophysicist with Gahagan Dredging Corp. *Civil Engineering*, June.

Roadside Plantings in Virginia

The Virginia Dept. of Highways and the Virginia Polytechnic Institute have set up test plots along highways to determine the value of various grasses under roadside conditions. Each plot is divided into two sections, one for fertilizer experimentation, the other for testing various seed mixtures and rates of fertilizer application. These have contributed a great deal toward establishing better turf, and the aim is to establish such test areas in every section of the state. Grass is considered the most desirable vegetation for areas adjacent to pavements. Areas to be seeded are first mulched and the seed and fertilizer are applied by hydraulic sprayers and held in place by the mulch. Sawdust and tobacco stems make excellent mulch. Asphalt mulch has not been successful. Seed is applied at the rate of 80 pounds per acre, and fertilizer at the rate of 2 pounds each of nitrogen, phosphate and potash per 1,000 sq. ft. Slopes that are too steep to be covered with grass are planted to rapidly growing vines, such as honeysuckle. Kudzu has been used on cut and fill slopes.

The present policy of the Highway Dept. is to plant no trees on highways with less than 110-ft. right-of-way, nor closer than 20 ft. from the edge of the pavement, nor in medians less than 50 ft. wide;

but this rule is not followed where high speeds are not practicable. In all cases, a minimum sight distance of 1,000 ft. must be maintained at all intersections and crossovers.

"Roadside Development Program." By H. J. Neale, Landscape Engr. of the Dept. PUBLIC WORKS, July.

Other Articles

"Highway **Engineering** in 1955" in England. Annual review. The Surveyor, May 19.

"**Organization and Operation** of a County Highway Department." By Paul Hartwig, Hwy. Comr., La Crosse Co., Wis. Public Works, July.

"**Alley Improvements** Need Engineering." By Fred M. Seguin. Public Works, July.

"The Design of **Thin Premix Road** Surfacings." By S. H. Kuhn, Sr. Research Officer, and P. J. Ridgen, Director, National Inst. of Road Research, Pretoria, So. African Municipal Magazine, April.

"Non-Destructive Methods for **Testing Concrete.**" Review of present experiments. By R. Jones, Road Research Lab., England. Contractors Record, May 16.

"Structural Aspects of Road Design: **Soil Mechanics.**" By P. L. Capper. Contractors Record, May 16.

"**Operation** From a Central Location" by road dept. of Lake County, Ill. By M. E. Amstutz, Supt. of Highways. Better Roads, May.

"**Culvert Performance** on the Alaska Highway in Canada." By J. Y. C. Quong, Ass't Bridge Engr. Better Roads, May.

"**Steel Bin Walls** Bolster Seaside Highway" in California. Roads and Streets, May.

"Better Profits from Better **Push Loading.**" By Kenneth F. Park. Roads and Streets, May.

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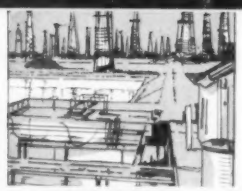
Refuse Production at Hospitals

Studies by a committee of the American Public Health Association indicated that combustible waste production at hospitals varies with the size of the installation. In a report in the *Journal* of the APHA, mean values of solid wastes are shown to approximate 9 lbs. per patient per day for hospitals with 100 patients; 7.4 lbs. with 200 patients; 6.7 lbs. with 300 patients; and 6.5 lbs. with 500 patients. Garbage production for the same patient loads was found to be 4.5, 3, 2 and 1½ lbs. per patient. Non-combustible wastes ranged from 2 lbs. per patient at 100-bed units to ½ lb. at 500-bed hospitals. Production of combustibles appeared to increase with size from 3 lbs. per patient to nearly 4½ lbs.



PUBLIC WORKS DIGESTS

THE INDUSTRIAL WASTE DIGEST

Fine Screens Used for Hat Fur Wastes

The discharge of waste hat fur into the Norwalk, Conn., municipal sewer system led to the use of fine screens of the Reinsch-Wurl type as an integral part of the sewage treatment plant originally designed in 1931. When the plant was enlarged and improved in 1951, the two existing screens were retained, and two more of the same design, furnished by Hendrick Manufacturing Co., were added. It was not considered practical to require the removal of the wastes by the hat manufacturers, because of anticipated difficulty in detecting non-compliance at the individual plants. Since the existing screens had proved satisfactory in separating the fur from sewage with disposal of the screenings by land fill, it was considered best to continue to use this method. Several modifications were made in the sewage treatment plant in 1951, one of which was to separate the screening chamber from the pump pit, where overflow of the screens could cause flooding of the pumps. An Eimco package-type vacuum filter was provided for sludge dewatering, and a single-stage elutriation tank with a Dorr sludge collector and thickener was used for conditioning sludge with ferric chloride prior to filtration. The fine screenings and sludge cake are discharged to industrial type dump cars operating on a 24-in. gage railway. The cars are moved manually to the dumping area.

"Hat Fur Wastes Fine-Screened from Sewage Flow and Placed on Dump area." By J. D. Marr and E. B. Cobb, Metcalf and Eddy. *Wastes Engineering*, June.

Flotation Used for Tractor Plant Wastes

In planning the waste disposal system for the York, Pa., plant of the Caterpillar Tractor Co., provisions had to be made for a rather high degree of treatment to be suitable for meeting the requirements of the City for disposal into its sewer system. The waste was expected to include soluble and insoluble oils, alkaline industrial cleaner fluids, mineral acids, and corrosive salts. A Bulkley Dunton Colloidair unit which had been successfully used by the Chrysler Corp. at Detroit was selected as the basic treatment. The plant, as designed, included holding tanks in which air is introduced and activated silica and alum are added; a retention tank for removing undissolved air; a flotation chamber, and a discharge tank. In the flotation chamber, alum floc containing oil rises to the surface and is skimmed off by flight scrapers. Solids are discharged to disposal pits, and the clear liquid is removed from the bottom of the flotation chamber and discharged to the city sewer system via a discharge holding tank. The treatment plant is capable of reducing oil content to less than 10 ppm. Further reduction is possible, if found necessary, by a plate and frame filter. The initial design was modified to include the installation of tray-collectors under the influent lines at the Colloidair to trap metal particles and to include, also, a 1½-inch disc-type meter. In the solids disposal pits, after the water had leached into the soil, the oil cake remaining is burned. Typical raw waste analyses show about 1600 ppm suspended solids; 120 ppm of oil; and a pH of 7.4. After treatment, the waste contains 24 ppm suspended solids and 8 ppm oil; and has a pH of 4.5. The average monthly discharge is 250,000 gallons.

Conflict of Interest in Water Pollution Control

What are the best uses of our streams? The answer depends very much on individual interests. In their paper "The Role of the State in Determining Water Pollution Requirements," presented at the Fifth Southern Municipal and Industrial Waste Conference, David B. Lee, Director, and John W. Wakefield of the Bureau of Sanitary Engineering, Florida State Board of Health, observe that the state regulatory agency serves as the umpire in the game of water pollution control. The teams in this league, each intent on gaining its own worthwhile goal, are:

1. Public water supply agencies who would like to maintain every stream in pristine purity without turbidity, color, taste, or bacteria, such that it could be supplied to the public with a minimum of treatment.

2. Public wastes disposal agencies who would like to have access to any available stream for the disposal of wastes with a minimum of treatment.

3. Industrial users who frequently need purer water than is needed for usual public water supply.

4. Industrial establishments requiring waste disposal who would like to look on the streams as the natural receivers for all liquid wastes with the minimum of treatment or no treatment.

5. Fishing and Wild Life Conservation groups who look on every water way as their special province for the propagation of fish and wild life.

6. Nature lovers who treasure every tree and who view every quiet pool and every trilling brook as something to be guarded against all trespassers.

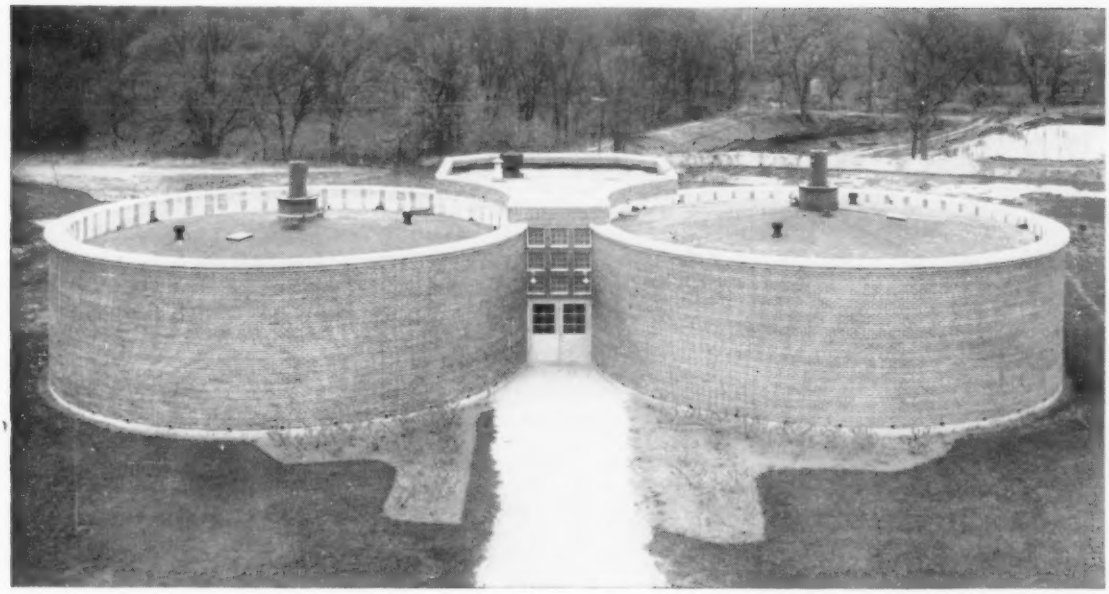
7. Agriculturists who at one and the same time would like to irrigate all dry land with pure wholesome water and would like to drain all wet land without undue expense.

8. Cattlemen who object strenuously to the elimination of waterways or the pollution of water used for stock watering but equally as strenuously insist on their right to drain needed pasture land.

9. Power interests to whom a flowing stream is of value only when it has been impounded as a source of power.

10. Shipping interests who maintain that streams were made to float boats.

Rochester's two 50′ digesters, each equipped with PFT Floating Cover



At Rochester, Minnesota . . .

Modern sewage treatment for world's medical center

EXPANDABLE NEW PLANT INCLUDES PFT "CONTROLLED DIGESTION"

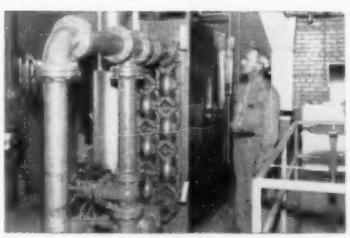
Looking far into the future, Rochester has built a trickling filter plant designed to grow with the city for the next 60 years! Completed in 1952, plans already call for additions that will handle 7 MGD by the year 2000 . . . nearly *twice* its present load. PFT equipment was installed in the plant for effective "controlled digestion."

A PFT Floating Cover is installed in each of the 50′ digesters for accelerated digestion and positive scum submergence. Operations are simplified because additions and withdrawals can be made at times best suited to the overall operation . . . no fixed levels need be maintained.

Breakdowns and repairs are materially reduced because Floating Covers contain no moving parts. Since no mechanical agitation is required, and heat is supplied from *external* heaters, all maintenance takes place outside the tank.

In the Control Room, a *PFT Heater & Heat Exchanger unit* (500,000 B.t.u. per hr.) maintains close temperature control of the digesters *automatically*. Fired by digester or city gas, it cuts fuel costs by utilizing all gas produced in the digesters. Effective "controlled digestion" is due in large part to this automatic heat control!

Congratulations to Rochester, medical center of the world, on its excellent new plant and its far-sighted planning.



Superintendent Walter C. Hogenson checks heat output of PFT Heater & Heat Exchanger unit in the digester control building.

Design of plant by / *Toltz, King & Day, Inc. St. Paul, Minnesota*

waste treatment equipment exclusively since 1893

P.F.T.

PACIFIC FLUSH TANK CO.
4241 Ravenswood Avenue
Chicago 13, Illinois

"Caterpillar Tractor Plant Solves Waste Problems." By Wm. W. Sellers, Caterpillar Tractor Co., York, Pa. *Industrial Wastes*, May-June.

Pollution Control and Impact on Industry

As population grows and industry expands, there will be increasing competition for water of good quality. Irrigation and recreational demands have increased, the former, 50% from 1949 to 1954, and the latter, 30% from 1946 to 1951. The stream pollution loading, based on sewered urban population, is increasing at an accelerating rate. Increased competition for water has resulted in demands for more vigorous pollution control. While specific information is not available as to the investment of industry in pollution control efforts, there are at least 2600 industrial establishments providing waste treatment, and it is probable that the investment will be of the magnitude of a billion dollars. Industrial production contributing to pollution has doubled in the last 25 years. To meet demands, pollution control administrators need to determine water uses, establish yardsticks to protect uses, and provide effective control. Before industry can fulfill its part of the control program, it is necessary to develop and evaluate sampling and analytical methods and waste quantities and characteristics: to ascertain the effect of discharge of wastes; to analyze pollution control preventive measures available; and to establish waste treatment. Industry will need to become more active in achieving objectives of maintaining business levels through public relations, of preventing losses from forced shut-downs, and of reducing losses caused by lowered water quality.

"Industrial Pollution Control." By Roy F. Weston, Weston, Eckenfelder and Associates, Newton Square, Pa. *Industrial Wastes*, May-June.

Foundry Dust and Fume Control Problems

To meet the stringent rules of the Los Angeles County Air Pollution Control District, it was necessary for the Lincoln Foundry Corp. to take remedial measures to control fume emission from its 54-inch cupola. Solution of the problem began with modifying the cupola by elevating the stack 10 ft. and building a movable baffle to limit air infiltration. These measures increased stack temperatures from 1046° to 1580°F. By using an Orlon acrylic fiber it was possible to install automatic shaking mechanisms in the filter collectors. Orlon had been proved resistant to temperatures as high as 275°F and to mechanical shaking. Evaporative cooling was chosen with the system consisting of a 78-inch diameter by 32-ft. high quencher with 17 spray nozzles and a 96-inch diameter by 20-ft. high secondary cooler with 7 spray nozzles. The collector selected was a five-compartment Wheelabrator Dustube apparatus with filter tubes 5 by 112 inches. In the cycle of operation, one tube at a time is cleaned by shaking and returned to service, every 15 minutes.

"Controlling Fume from Foundry Cupolas." By E. F. Anderson, Wheelabrator Corp., Mishawaka, Ind. *Industrial Wastes*, May-June.

Stream Temperatures and Fish Survival

The heat tolerance of fish was studied by determining thermal death points by two methods: the acute test (large temperature increases in a short time) and the chronic test (gradual increase, day by day). Bluegills, channel catfish, bullheads, pin perch, and top minnows were used as test specimens. A temperature acclimatization process was used in connection with the acute tests, with the acclimatization period extending over several days. The results indicated that death of the fish from temporary heat exposures may occur many days after the initial shock period. In the chronic tests, fish were maintained in thermostatically-controlled tanks while the temperature was increased 2° C each day for 30 days until a predetermined maximum was reached. This high temperature was then maintained for 60 to 120 days longer. In working with Texas bluegills, it was determined that the geographical origin of the fish was not significant. Resistance to disease and toxic chemicals is usually decreased by prolonged exposure to high temperatures. Food consumption is markedly increased, but fish become emaciated. A relatively small amount of heat introduced into a stream has little detrimental effect; moderate loading will not destroy the biodynamic cycle, but will cause death of a few sensitive species; and a heavy loading will cause all but very tolerant forms to disappear.

"Effects of Heat on Fish." By John Cairns, Jr., Academy of Natural Sciences, Philadelphia. *Industrial Wastes*, May-June.

EFFICIENT and ECONOMICAL

COUNTY HIGHWAY ADMINISTRATION

This paper by Allan M. Williams, President, County and Local Roads Division, ARBA, and County Highway Engineer, Ionia County, Michigan, was presented at the 42nd Annual Road School, held at Purdue University.

THE STATE law, which governs the basic aspects of highway administration in Michigan today is known as Act 51 of the Public Acts of 1951. Under the provisions of this Act, the proceeds of the state's gasoline tax, motor vehicle license tax and other miscellaneous fees are all placed in a single fund known as the Motor Vehicle Highway Fund. After deduction of collection costs, the fund is apportioned under a formula which provides that the state shall receive 44 percent of the proceeds, the counties 37 percent and the cities and villages 19 percent. All county roads are classified under the law into primary and local roads. The 22,000 miles of primary roads receive 75 percent of the county apportionment and the 64,000 miles of local roads receive the remaining 25 percent. The primary road money is apportioned among the counties on the basis of motor vehicle registrations, road mileage and rural population. The local road money is apportioned on the basis of mileage and rural population alone. The sum of $5,000 is returned to each county, which employs a full-time registered, professional engineer. The law originally allowed the counties 5 years to acquire an engineer or forfeit the annual $5,000. However, a bill has passed the Legislature this year to extend this period another three years, in view of the shortage of engineers.

The state highway commissioner is made responsible for the expenditure of all state collected highway funds. Each county road commission and incorporated city and village of the state must submit to the state highway commissioner its biennial highway and street programs, based on long-range plans, with standard specifications for projects included.

The state highway commissioner must report biennially to the Governor and the State Legislature, describing progress made by the state highway department, the county road commissions and the cities and villages in carrying out the adopted highway and street programs. He must also account for all expenditures of funds allocated from the Motor Vehicle Highway Fund to the state highway department, the county road commissions and the cities and villages.

To assist the state highway commissioner in carrying out his responsibilities, there has been created a major unit in the highway department known as the Local Government section. This section works closely with all county road commissions, cities and villages in assisting them with their programs, their accounting, reporting, etc. It is primarily through this section that state and local highway administrations are coordinated. This section also provides administrative and engineering assistance to county road commissions participating in the federal aid secondary program.

A review of Michigan highway needs has just been completed by a joint Legislative Highway Study Committee, and Michigan's highway laws are now being recodified. Legislative action will be required to revise a mass of highway law into a simplified code to guide the highway administrator in his modern day operations.

To further the cause of efficient county highway administration, the counties maintain an organization known as the County Road Association of Michigan. This is a non-profit Association, supported by the Counties, with a Board of Directors, who hire an engineer-director for the purposes of carrying out the policies of the organization, co-ordinating its activities and keeping the county road commissions informed of legislative, engineering and administrative matters which may benefit or adversely affect their organizations.

As a result of a constitutional split in the state sales tax revenue in 1946, a substantial amount of money was annually diverted into the township treasuries. Since the counties can levy no property tax for the support of former township roads and are allowed to spend only 25 percent of their own funds for their support, the sales tax revenue of the townships has been sought by the county road commissions as matching money for construction, snow removal and maintenance undertaken on former township, now county roads.

The townships are presently contributing about $6.5 million dollars annually for county road purposes in Michigan.

The county road commissions are bodies corporate, which means that they can carry on legal transactions in their own names without the approval of higher county authority, such as the county board of supervisors. Collectively, the road commissions are responsible for the annual expenditure of approximately $75 million in state and locally collected highway revenues. The boards of county road commissioners are composed of a chairman and two other members, who serve six-year staggered terms at salaries ranging from no remuneration to $5,000 per year. These commissioners are selected in two ways: In 72 of the counties, the road commission is selected by the county board of supervisors and in 11 counties, the board is elected at a general election. The consensus of opinion is that the appointive method serves the county better than does the elective method.

There is a clear and fundamental difference between the function of the road commission and county engineer or superintendent. To determine policy, the road commission

must make decisions on the main county road problems, regardless of whether the solutions are proposed by its own members, by administrative officials or by private citizens. In so doing, it may take into consideration any facts that it considers pertinent, and give the county engineer, by collective action, orders setting forth the general objectives it wishes to attain. It is not the function of its members to attempt to administer personally the policies that it determines, or to influence the administrative officials charged with the execution of these policies.

The county engineer serves the road commission by providing it with advice and information on the conduct of highway affairs, and by putting into effect its decisions through the use of available funds, equipment and personnel. To interpret and explain the technical aspects of highway problems to his board and to the public is one of the principal tasks of the county engineer. He must educate the road commissioners and the community in highway affairs.

The county engineer's proposals are subject to review by a board of laymen whose principal personal interests are not in governmental affairs. The process of review is of advantage to all concerned in two ways. First, it forces the expert engineer to consider his proposals in the light of general interests of the county, rather than in the light of his own specialized interests or technical preoccupations. The necessity of convincing laymen of the advantages of his proposals makes the county engineer's proposals more practical and keeps him in touch with public opinion. Secondly, it gives the county engineer a chance to have his proposals considered and supported by a group of men who are interested in all aspects of county road development.

In Michigan, we have both engineers and non-engineers in the top county road administrative posts. Registered, professional engineer-managers occupy the top spot in 41 counties. Superintendent-managers occupy the chief administrative posts in 42 counties. Of these latter 42 counties, however, 12 have registered professional engineers working under the superintendent-manager and 9 counties have graduate civil engineers on their staffs, who will seek registration as soon as they have sufficient experience to qualify. Modern county road management requires a basic understanding of technical engineering principles.

A certain minimum amount of county highway funds should be required for planning, engineering and administration. Without earmarked funds, inadequate amounts are spent for these essentials because it is believed that these are luxuries enjoyed only by large organizations and that, on the local level, every possible dollar must be spent on the physical plant. Consequently, money is wasted through continued maintenance of roads and equipment without benefit of records to show when their usefulness has expired, or on what account the money has been spent, or should be spent in the future. Construction and maintenance do not conform to prevailing standards and plans are made on the basis of opinion or public pressure rather than on the basis of actual need. The superintendent of such an organization cannot improve his administration because his full time is occupied issuing individual orders, inspecting results and carrying out details of the day-to-day routine which should be delegated to others.

With earmarked funds for engineering and administration, the engineer or superintendent can be supplied with adequately paid assistants with modern equipment to relieve him of many of the details of his job. He can then direct the planning of a program of highway improvements based upon need and integrated with the programs of other counties, cities and the state. He can devote more of his time to his relations with the road commissioners and the general public.

With earmarked funds, the engineer's or superintendent's salary can be made sufficiently adequate to attract and retain a capable man in the most important position in the organization. An effective record system can also be maintained, which will serve as a guide in future management and planning problems.

There is, perhaps, nothing which gives greater meaning to day-to-day administration than a flexible long-range plan, which clearly outlines the objectives of the county road organization. There are four steps in the planning process. These steps are: (1) There must be assembled adequate information as to what the county actually is, physically and functionally. (2) There must be searching analysis of the data in order to ascertain important relationships, trends and developments in traffic needs. (3) The beginning of plan making which is a positive

determination of long-range objectives in county road development based upon the data analysis. (4) The county must do something about the plan. The plan is not an end in itself, but merely the means to an end. There should be programming of capital improvements over a period of years, so that expenditures may be allocated in accordance with an orderly budgetary plan.

Other Phases

Besides planning, the science of economical and efficient administration deals with such subjects as organizing, staffing, coordinating, budgeting, purchasing, equipment management, reporting, directing, and public relations. This is a tremendously broad and diversified field. In the area of coordination we have found most effective in Michigan the use of two-way radio between the central county garages and field equipment. Forty-five of our 83 counties are now making use of two-way radio, and the applications for FCC licenses of several more counties are pending. We have found that, by the use of radio, the efficiency of operation of both personnel and road equipment is increased to such an extent that the initial cost of the radio is insignificant by comparison.

The field of county road public relations is a most important area of public administration in which too many county highway organizations are lax. To the highway administrator, the object of a sound public relations program is to take the public into his confidence, and to make an ally out of the people he serves. A public relations program is not a substitute for a poor job, but a process whereby a good job is made to seem as good as it is.

Charlotte, N. C., Installs 50,000th Water Meter

LOCATION of the 50,000th water meter in Charlotte, North Carolina, installed with a brief ceremony on June 15, might be considered a sign of the times. The meter, which marked a milestone in the growth of Charlotte and its water department, was installed on the premises of Paradise Pools of North Carolina. This firm will maintain a demonstration and sales display of backyard swimming pools. It has been estimated that water requirements to fill such backyard pools will follow closely after lawn sprinkling and air conditioning as important factors in the Nation's increasing demand for water for all purposes and needs.

● **INSTALLING Charlotte's 50,000th water meter. Left to right: Mayor Van Every; Sam Puckett, senior foreman of the water department; Ralph West, owner of the property where the meter was installed; and W. M. Franklin, Water Sup't.**

TREATING MEAT PROCESSING WASTES

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Sanitary Engineer,

Wilson & Company, Inc.

Chicago, Illinois

This article has been slightly condensed from a paper presented at the Fifth Southern Municipal and Industrial Waste Conference at the University of North Carolina, Chapel Hill, North Carolina.

A WIDE RANGE of treament processes is available to the small slaughter house operator. Selection of the process most suitable for each individual case depends upon an engineering evaluation of the slaughtering procedures in the plant; a study of the variation in kills (daily, weekly, monthly, and seasonal); the land available for waste treatment (area, topography, soil type and drainage); by-product utilization and disposal facilities for blood, grease, and offal; available facilities for disposal of sludge from waste treatment processes; minimum dilution available in the receiving stream; and the competency of operating personnel.

The first step is an evaluation of waste handling within the plant—that is, a fact-finding survey to develop the economical level of waste prevention and waste utilization measures before treatment requirements are determined. The cost of each internal improvement for reducing waste should be weighed against the cost of treating the same item of waste in a treatment plant. Thus a greater expense in waste prevention can be justified where an expensive treatment process is required than where an inexpensive treatment process is satisfactory. Waste saving practices also vary with the volume of kill, the processing of by-products in the plant, and the feasibility of sale or other disposal of screenings, settled sludge, unrendered grease skimmings, blood and slimes. Thus in some instances a small plant some distance from a renderer may find in-plant recovery of some wastes to be uneconomical or impractical, so such wastes will necessarily be added to the waste treatment load.

Screening of liquid wastes through either mechanical or stationary screens is certainly justified in every instance, not only for recovery of offal which is generally salable but, more important, for removal of solids which can interfere with the treatment process and with mechanical equipment in the process.

Grease recovery basins are also generally justified, particularly if the plant processing includes rendering or if a rendering plant is nearby. Excess amounts of grease can complicate many waste treatment processes, unless the treatment plant has been designed to handle this special load.

Paunch manure is also generally disposed of elsewhere. The economics of saving blood and casing slimes (where casings are recovered) should be carefully evaluated, recognizing that the high BOD (30,000 to 50,000 ppm) and solids content (40,000 to 60,000 ppm total solids) of these wastes may complicate the waste treatment process.

After all possible waste reduction measures have been instituted, the remaining waste must be analyzed to determine the type and degree of treatment necessary to satisfy local requirements.

The following is an evaluation of waste treatment methods which may be used in treating meat processing wastes.

1). *Solids Removal by Subsidence and Flotation*—Sedimentation, with grease removal, will remove from 25 to 40 percent of the BOD, which is often sufficient treatment. Further BOD reduction is possible with the addition of flocculation.

In recent years some plants have installed flotation systems for grease and solids removal. In this process air is introduced under pressure into the raw waste (or recycled effluent) prior to discharge into a detention tank. The sudden reduction in pressure upon discharge of the wastes into the detention tank causes release of the pressurized air as small bubbles, lifting the solids and greases to the surface where they are removed by conventional skimming mechanism. Addition of alum is generally necessary in the case of slaughtering wastes. This complicates the rendering process, forming alum soaps in the rendering tank and reducing grease yields.

2). *Septic Tanks*—Kountz reports[1] that BOD reductions of 78.1 to 93.4 percent were obtained with displacements of 25 percent to 10 percent, respectively, in laboratory septic tanks treating slaughtering wastes. This would indicate that a septic tank with a capacity of four to ten times the daily flow should give fairly good BOD removal. Thus, a raw waste of 1500 ppm BOD discharged to an adequately sized septic tank will yield an effluent ranging from 100 to 300 ppm BOD. Disposal to an open sand bed through intermittent dosing siphons would further polish the effluent, if necessary.

3). *Intermittent Sand Filters*—The intermittent sand filter, long popular for treatment of wastes from many types of small installations, will treat this type of waste. The waste is first discharged into a conventional sedimentation tank, small septic tank, or Imhoff tank. It is then dosed onto sand beds through dosing siphons. The sand beds normally consist of two to three feet of washed sand with a grain size of 0.2 to 0.5 mm., laid on a bed of 6 to 12 inches of graded gravel (from small to 2-inch gravel in layers). Dosage for domestic wastes is ordinarily from 50,000 to 150,000 gallons per acre per day, although Kountz [1] applied slaughter house wastes at 200,000 gallons per acre

per day, in four daily doses at two-hour intervals, on sand filters 24 inches deep laid on 6 inches of gravel. BOD reductions were 95 percent in the summertime and 85 percent in the winter. Sand beds for domestic wastes are usually small, from 20 to 30 feet on a side, to limit the sizes of dosing siphon and dosing tank to reasonable economic limits. The bed is usually flooded from one inch to three inches in depth per dose.

This type of plant is simple to operate and requires little maintenance. Raking the sand about twice a month will break the light crust that results from carry-over of suspended solids from the sedimentation or septic tank. Normally, the upper two or three inches of sand is replaced annually.

4). *Trickling Filters* — Trickling filters are generally too expensive for slaughter houses killing less than 10,000 pounds live weight daily. However, BOD removals in excess of 95 percent have been reported[2] using a trickling filter following a septic tank, recirculating the filter 4½ to 5 times at a rate of 20 mgad, with a raw BOD of 725 to 750 ppm (septic tank effluent). This treatment is recommended only for larger slaughter houses operating on a five or six-day week where competent supervision is available and where space limitations rule out other more simple processes.

5). *Chemical Treatment*—Chemical coagulation using chlorine and alum, ferric salts and lime, and chlorine and ferric chloride[3] has been used in some instances. In treating with chlorine and alum, Kountz reports[1] an average dosage of about one ounce of calcium hypochlorite per 100 pounds live weight kill at a chlorine cost of 5¢ per hog or 20¢ per steer, with alum dosage, depending upon the pH and alkalinity of the water supply, ranging from ten to twenty pounds per thousand gallons of waste. He reports reductions of 95 percent in BOD, with, however, lower reductions of 60 to 70 percent as the amount of process cooking in the plant increases. Cooking hydrolyzes the animal proteins and thereby reduces the amount of proteins capable of being precipitated by the chlorine. Kountz reports that the sludge from the process dried readily on sand beds without nuisance. Treatment can be by either flowing-through or batch process. Batch process is generally preferred because variations in strength and solids concentration of the wastes during the day will require some adjustment of the chemical dosage. The higher operating cost and necessity for conscientious operation make this process somewhat less desirable than the intermittent sand filter or septic tank treatment. It is useful as pretreatment where BOD reduction is necessary prior to discharge to municipal sewers or as complete treatment in small plants where space limitations preclude the use of other treatment processes.

6). *Anaerobic Digestion*—This is the newest process in the treatment of slaughter house wastes. A pilot plant treating up to 8,500 gallons of waste per day has been operating for five years at Austin, Minnesota[4], and a large scale plant of this type is now under construction at Albert Lea, Minnesota[5]. The process consists of digesting an intimate mixture of seed sludge and waste at about 95°F in a closed digester. Gas evolved in digestion is collected and can be used in mixing and heating. Experimental work indicates that the detention time in the digester can be as low as twelve hours. The digester effluent is run through a vacuum device to release some of the entrained gas and then

flows through a separation tank. Most of the separated sludge is returned to the digester for seed. Waste sludge can be dried on sand beds or used directly as a fertilizer.

This process can be loaded up to four times the rate possible for conventional aerobic processes. Construction costs are estimated at about half the cost of a comparable trickling filter plant, and the system will discharge an effluent of 50 ppm BOD. The process is sufficiently rugged to absorb variations in waste characteristics from day to day and hour to hour, and the treatment efficiency is not affected by intermittent operation. Experience with the large scale plant at Albert Lea is expected to be useful in developing design criteria for smaller installations.

7). *Irrigation*—For economy and simplicity of operation, irrigation has no equal in waste disposal. A large number of vegetable and fruit canning plants, several dairies and a few poultry processing plants are successfully disposing of processing wastes by land irrigation. The types in common use are spray irrigation and ridge-and-furrow irrigation.

A spray irrigation system consists of a screen to remove solids that might clog the nozzles; an irrigation pump drawing from a wet well; aluminum, plastic or galvanized piping laid on the ground and the necessary irrigation-type spray nozzles. In ridge-and-furrow irrigation the wastes are distributed to the land through ditches spaced at regular intervals. Various pasture grasses normally popular in an area can be grown successfully when irrigated with food processing wastes.

A search of the literature has failed to yield any information on irrigation of slaughtering wastes, but successful use of this process at two poultry dressing plants is reported[6]. At one poultry plant (Springdale, Arkansas) the entire plant wastes are discharged through four-mesh screening, thence to a 2600-gallon holding tank, from which an irrigation pump with a capacity of 125 gpm at 90 feet head discharges the waste through 4-inch and 3-inch aluminum distribution lines to a 20-acre tract set aside for waste disposal. The soil is a tight clay loam, and the field has been sown to permanent pasture with a mixture of orchard grass and ladena clover. In 1954 the hay crop yielded $2,000. Waste flow ranges from 14,000 gpd in the winter to 22,000 gpd in summer, with a dosage rate up to 0.4 inch per day on two acres at a time. The portable laterals are moved

around the field as needed, and one worker spends about sixteen hours per week in this operation.

At the Hammond Poultry Processing Co., near Fayetteville, Arkansas, wastes are successively screened through ten-mesh and twenty-mesh screens and then discharged by a pump rated at 125 gpm at 90 feet head to a five-acre field. One acre is dosed at a time. Application rate is 0.58 inch per day; so far only three acres have been used. During peak season the daily flow is about 20,000 gallons, and the annual application on the three acres is estimated at about sixty inches. No run-off or pooling has been noticed in two years of operation. Percolation tests show that the soil absorbs one inch of water in five minutes. Moving the laterals requires about ten manhours per week.

Indications are that wastes containing sodium in excess of 100 ppm or more than 50 percent of the cations are detrimental to most soils, so each waste and each local situation must be evaluated. No irrigation program should be attempted without experimental evidence extending over at least one season indicating successful disposal without deleterious effects on the soil or the underground water supplies.

Considerable information on disposal of industrial wastes by irrigation is available in the literature. Excellent summary papers were presented at the 1956 Wisconsin Industrial Waste Institute on "Land Disposal of Wastes".

Slaughter house waste, of all industrial waste, most nearly simulates domestic sewage when diluted down to the range of BOD typical of sanitary wastes. It is, therefore, readily treated in municipal sewage treatment plants. Difficulties in treating slaughter house wastes along with domestic sewage in municipal treatment plants are invariably due to overloading of the municipal plant or to the discharge of materials such as grease, paunch manure, and the like, which can be intercepted at the slaughter house.

Any development of a waste treatment program should include, in addition to a design of the treatment plant, recommendations on waste saving and waste utilization and recommendations for the disposal of screenings, waste treatment sludge and other non-treated wastes and by-products. Such recommendations are particularly useful to the operators of small slaughtering establishments who do not have such technical advice readily available.

1) Kountz, R. R., "Treatment of Waste from Small Slaughterhouses." Proceedings of the Ninth Industrial Waste Conference, Purdue University (1954) pp. 195-200.
2) Eldridge, E. F., "The Recirculating Filter for the Treatment of Slaughter-house Wastes." Michigan Experiment Station Bulletin No. 96 (1943).
3) Eldridge, E. F., "Industrial Waste Treatment Practice." McGraw-Hill (1942) pp. 272-277.
4) Schroepfer, G. J., Fullen, W. J., Johnson, A. S., Ziemke, N. R., and Anderson, J. J. "The Anaerobic Contact Process as Applied to Packinghouse Wastes." Sewage and Industrial Wastes, 27, 4 (April, 1955).
5) Steffen, A. J. "Full-scale Modified Digestion of Meat Packing Wastes." Sewage and Industrial Wastes, 27, 12 (Dec. 1955).
6) Bell, J. W. "Spray Irrigation for Poultry and Canning Wastes." Public Works, 86, 10 (Sept. 1955).

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Los Angeles Noise Control

The July issue of *Noise Control* features an article by Paul S. Veneklaser, "City Noise in Los Angeles." Reprints may be obtained from *Noise Control*, Dept. M, 57 East 55 Street, New York 22, N. Y.

BRITISH WATER POLLUTION RESEARCH

IN THE ANNUAL report for 1955, the British Water Pollution Research Board summarizes briefly the results of investigations made during the year. Following are typical of those reported on:

An investigation on the effect of pollution by effluents containing organic matter on the oxygen content of streams has been begun. The chief difficulty in this it to measure the rate at which the water dissolves oxygen from the air, on which there has hitherto been little direct observation. The method now being adopted, where it can be used with safety, is to lower the oxygen content of a stream by addition of a reducing chemical and then to observe directly the rate of re-oxygenation. In a polluted stream the oxygen content at a given point may vary widely from time to time and the work has emphasized how misleading an impression of the state of a river may be given by considering a single set of observations.

Work on synthetic detergents has shown that their toxicity to fish is due chiefly to the anionic surface-active agent which they contain. It appears that when sewage containing detergent is treated by biological filtration the effluent, which will contain a certain concentration of detergent as determined by the ordinary method of analysis, is less toxic than water to which the same concentration of detergent has been added. The reason for this is not known. The resistance of fish to low concentrations of dissolved oxygen is reduced if small quantities of detergent are added to the water.

Some work carried out during the year has emphasized the important effect which the nature of the diluting water in the test for biochemical oxygen demand (B. O. D.) may have on the result obtained. If standard dilution water containing an ammonium salt is stored too long before it is used, active nitrification may be occurring in it and this will probably continue during the period of incubation of the diluted sample. Work is also reported on the relation between the five-day B. O. D. and the ultimate oxygen demand of various types of effluent. For a given B. O. D. the ultimate demand may be much higher for a treated sewage

effluent than for a diluted settled sewage.

Laboratory experiments have been made with percolating filters ventilated with mixtures of oxygen and nitrogen in different proportions. If the proportion of oxygen in the mixture is reduced the first effect is to reduce nitrification. It appears that the supply of oxygen by natural ventilation of a filter is not normally a factor which limits the rate at which sewage can be treated within the range of rates used at a sewage works.

In experiments with pilot-scale percolating filters treating sewage containing synthetic detergents, when the detergents were first applied very little passed through the filtering medium. Thereafter the proportion discharged with the effluent gradually increased to a value between 30 and 40 per cent of the amount applied — a result which seems to be in general agreement with observations from large-scale practice.

Some observations were made of the performance of an alternating double filtration plant treating sewage at Bedford. The average loading was 0.32 lb. B.O.D. per cubic yard per day and effluents of very good quality were obtained.

Industrial waste work carried out during the year included studies with pilot plant on the biological destruction of cyanide, and with small-scale plant on the anaerobic digestion of meat wastes, the treatment of washing waters from cattle sheds, and the treatment of waste oil-in-water emulsions. A large-scale plant based on the work of the Laboratory is now operating at an aerodrome for the treatment of emulsions resulting from the washing of aircraft.

"Water Pollution Research 1955" is published by H.M.S.O. for D.S.I.R. price 4s. Od. (72 cents U. S. A.) by post 4s. 3d. Address Dept. of Scientific & Industrial Research, Charles House, 5-11 Regent St., London, SW1, England.

• • •

Buses and Air Pollution

Regulation of the hydrocarbon-vapor emissions of buses is part of New York's efforts in air pollution control. Bus companies have been asked to plan their operations to avoid the emission of visible smoke or fumes after they have moved 100 yards or more and when they are stationary, not to idle motors for more than 3 minutes while standing at a terminal, and to equip their vehicles with fume-reducing devices.

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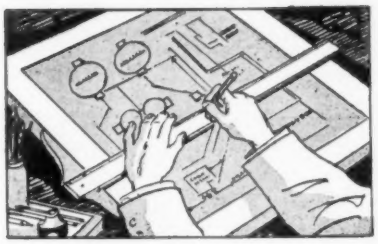

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IMPROVING HOUSING AND CORRECTING SLUM CONDITIONS

AN EXCELLENT example of what can be done to improve substandard housing is the results obtained in Charlotte, N. C. These are reported in a "Blueprint for Neighborhood Conservation" from which the following data are abstracted.

The program was initiated at the end of World War II. Real estate experts personally made inspections of decadent dwelling units and were convinced that through proper rehabilitation many could be converted into clean, decent, adequate shelters at economical rent, even for those in the city's lowest income groups. Drafting a program of action to attack housing blight and improve neighborhood environment was the next step. Suggestions for ridding the city of slum dwellings and inferior living conditions were embodied in a six-point program presented to the city government:

Six-Point Program

1. Enact a minimum standards housing code to cover all dwelling units, both existing and new construction.

2. Provide playgrounds and recreational facilities for residents in rundown areas earmarked for rehabilitation.

3. Exert close supervision on layout of new subdivision to make sure that traffic flow and other factors will be adequate for future development and expansion.

4. Install adequate street lighting and make necessary improvements to all streets in the older neighborhoods.

5. Establish social service education programs in downgraded areas to teach residents fundamentals of health, sanitation and property care.

6. Set a deadline for all dwelling units in the city to comply with the minimum requirements of the housing code.

The Charlotte City Council enacted into law the six-point program and also adopted a code establishing adequate health and safety standards for dwellings. As a result, the following standards were set up; every dwelling unit in Charlotte is required to meet them: 1) Inside running water; 2) inside private tub or shower; 3) inside pri-

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vate toilet; 4) wiring for electric lights; 5) adequate heating facilities; 6) screening for all outside openings; 7) structural soundness; 8) minimum room sizes: living room not less than 150 square feet; first bedroom not less than 100 square feet; other bedrooms, if any, not less than 70 square feet each; 9) all rooms, except bath, shall have window area of not less than 1/10 of their floor areas; bathrooms shall have outside windows providing light and air, in accordance with the building code.

Beginning in mid-1948, the Charlotte drive got under way to bring all deficient housing units in the city into compliance with the new code. When the compliance drive started, Charlotte, a city of 135,000, had more than 10,000 "problem" housing units, according to J. E. Ritch, director of slum clearance. Latest available figures show that the community has 37,874 dwelling units of all types. As of March 31, 1955, the drive had brought 10,540 substandard houses into compliance with the law since August 1948. During the same period, 1,413 houses were demolished under the program.

1,880 Families Relocated

It is estimated that some 1,880 families have been relocated as a result of demolitions and reduction in overcrowding. These families have been rehoused in privately-owned rehabilitated or new quarters. The city has paved more than 55 miles of streets and built new schools in the old areas. One of the outstanding achievements in the Charlotte picture is the increase in new construction that has accompanied the city's neighborhood conservation program. The enforcement drive has stimulated the construction of some 2,000 new dwelling units designed to take care of relocating families.

An estimated $750 per house has been spent in bringing the 10,540 rehabilitated units into compliance with the housing code. This amounts to $7,905,000. Estimated new construction costs add another $8,000,000 to this total. Combining these two figures shows that an excess of $15,900,000 worth of assessable property valuation has been added to the city's tax books.

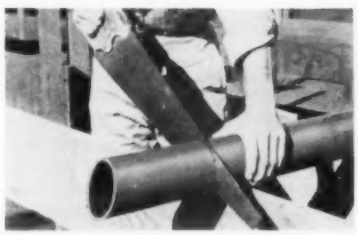
The cost to the city of the slum clearance program has been far exceeded by the additional collected fees for inspections, plumbing, electrical and building, generated by the program. But most important, Charlotte has seen almost 30 percent of its housing units directly improved by firm housing code enforcement.

PUBLIC WORKS
EQUIPMENT NEWS

Published Monthly **July, 1956**

A New Type Drainage Pipe

Chem-Weld, a drainage pipe of an unusual new material, is introduced by Southwestern Plastic Pipe. It is said to be strong, durable, lightweight, unaffected by most acids and alkalies, not subject to rust or electrolytic corrosion and completely root-proof. Water-tight joints are quickly made by a chemical cement that brings about a fusion of the pipe to the fitting. Standard lengths are 10 feet with 20 or 30-ft. lengths available on order. It is manufactured in 2, 3, 4, 5, and 6-inch diameters. A complete line of standard fittings is also carried in stock. More information is available from Southwestern Plastic Pipe Company, P.O. Box 117, Mineral Wells, Texas, or circle **No. 8-1** on the reply card.



Ice Control Spreader

A power hydraulic spreader designed to handle ice control materials most efficiently and is also usable for summer maintenance and construction work is the new Wausau Model RT-1 material spreader. The usual conveyor has been eliminated and in its place a hydraulically controlled ejector plate within the spreader box propels the entire mass of material forward to the point of discharge as required. Simple and positive speed settings for both feed auger and spinner permit exact control of the quantity of material and width of spread. The entire unit is self-contained and can be placed on any truck chassis. Other features include self-cleaning body, exact control of spinner speeds, one-man cab control, low loading height and center of gravity. More details available from Wausau Iron Works, Wausau, Wisconsin, or circle **No. 8-2** on the reply card.

Spreader fits any type truck chassis

Agrihoe Trencher-Digger

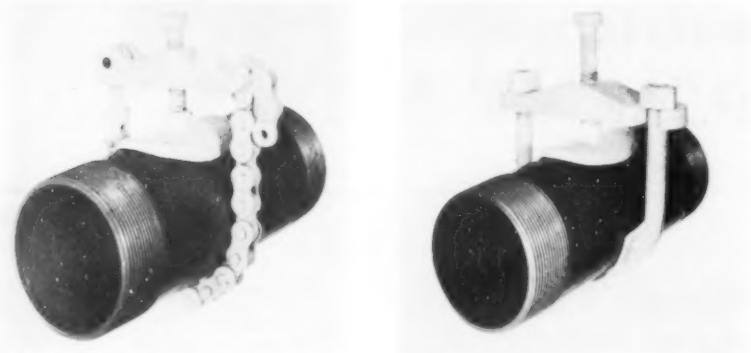
A diminutive crawler tractor, the Agrihoe, with trencher-digger attachment is announced by Joost Mfg. An advantage of the Agrihoe is its ability to perform in limited spaces where larger equipment cannot readily maneuver. Basically, the unit consists of a Model F long track Agricat (also made and distributed by Joost) which is equipped with a hydraulically-operated back-hoe attachment. The unit has a 10-ft. reach, can dig to a 6-ft. depth, and load to a 7-ft. height. It is one of several versatile light earth movers put out by Joost. More information from Joost Manufacturing Co., 742 Bancroft Way, Berkeley 10, Calif., or circle **No. 8-3** on the reply card.

Hydraulic Aerial Beam for High-Up Work

The new hydraulic aerial beam, designated the Series AB-1-41 "Sky-Master" and announced by McCabe-Powers, carries a workman over, under, or around obstacles, in an insulated enclosure which permits him to work with ground-level ease in out-of-the-way overhead places. A pair of independently-operated steel beams, installed on a rotating mast, move the work basket to any position within operating range. The outer beam can be moved in an operating arc of 270 degrees, and the inner beam can be positioned in a 115 degree arc. When fully extended, the Sky-Master has a ground-to-basket floor height of approximately 41 feet and a safe load capacity in all positions of 350 lbs. Hydraulically - operated outriggers are installed on each side of the body to assure absolute stability regardless of work basket position. The unit can be installed on slightly-modified standard bodies in the Powers-American line, or on any body designed to fit specific needs. Power for operation is derived from a hydraulic pump which is driven by a power take-off installed on the truck transmission. For complete details write McCabe-Powers Auto Body Company, 5900 North Broadway, St. Louis 15, Missouri, or circle **No. 8-4** on the reply card.

Aerial beam for maintenance divisions

Repair Pipe Leaks With Atlas Patches



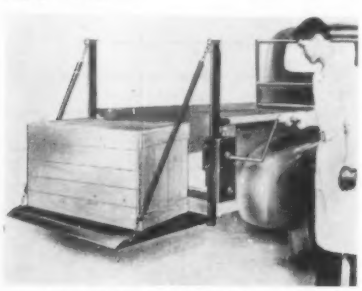
New tool that repairs pipe leaks quickly, permanently and economically is available from Atlas Industries, Inc., Box 8152, Houston, Tex. The patch is applied directly over the leak, pressure is applied by the clamp. Check **No. 8-5** on the card

All-Purpose Weed and Grass Cutter

A hand operated weed, shrub and grass cutter with a limber blade has just been introduced by Weed Whip. It has a 36-inch long hardwood finished handle with a 13-inch long tempered spring steel blade that glances off rocks and stays sharp. The Editors of Public Works have used this tool and have found it is fine to trim around posts, sidewalks, houses and trees. It is easy to use and very handy. Weighing only 1 lb., it retails at $1.49. For full details write to Weed Whip Mfg. Co., 2227 George St., Anderson, Ind., or circle **No. 8-6** on the reply card.

"Jiffy-Lift" Elevating Tailgate

A new "Jiffy-Lift" elevating tailgate for pickup and express truck bodies is announced by Mid West Body. This unit is a wholly "packaged" kit, ready to install in less than two hours. The complete unit weighs only 175 lbs., which keeps the vehicle within its present license fee; it has a lifting weight of 600 lbs. It requires no maintenance other than occasional lubrication. For full details write Mid West Body & Manufacturing, Paris, Ill., or circle **No. 8-7** on the reply card.



Elevating tailgate for pick-up trucks

Highway Guard Rail

A new deep-beam standard highway guard rail, the Protecto-Beam, has just been introduced by Syro Steel. Available in 10 and 12-gauge, the rail meets the new standard specifications for beam type highway guard rail. Companions to Protecto-Beam are Protecto-Rail guard rails. There are three styles of Protecto-Rail, the high-rib, 8-ft. x 7-in., the flat-rib, 8-ft. x 8⅛-in., and the 9-in. heavy duty rail, 8-ft. x 6-in. These are designed for erection at parking

Deep-beam standard guard rail

lots, shopping centers, schools, parks, and buildings. For full details write Syro Steel Co., Girard, Ohio, or circle **No. 8-8** on the reply card.

Drilling Machine Has Increased Adaptability

A 1956 model of the Truco portable drilling machine, completely redesigned to accommodate diamond bits up to 14 inches, has been introduced by the Wheel Trueing Tool Co. The new Truco unit can drill in any position, having a 360 degree arc of swing. Speed in drilling is a principal advantage. With standard Truco swivel diamond bits, any size hole up to 14 inches can be drilled in concrete, tile, granite, marble, brick and other hard, brittle materials. Weighing but 200 pounds, the unit can be easily dismantled and carried in parts by one man. For drilling in cramped quarters, it can be mounted on a 6-inch square base and locked in position against floor and ceiling or from wall to wall. The motors operate on AC or DC current with 110 volts of 60 cycles or less. More information from Wheel Trueing Tool Co., 3200-231 W. Davison, Detroit 38, Mich., or by circling **No. 8-9** on the reply card.

Lightweight Crawler Tractor

A tractor and angledozer that can be used for light excavation, grading, road construction and maintenance is announced by Mity Kat. The unit weighs 2350 lbs. and has an overall length of 92 inches. The tractor is powered by a gasoline engine with a fuel tank capacity of 9 gal. and has an electric fuel pump. For full details write to Mity Kat Tractor Co., 211 Corporation Way, Medford 55, Mass., or circle **No. 8-10** on the reply card.

Automatic Curb-Paver For Bituminous Material

A heavy duty automatic curb-paver that lays 90 per cent compacted bituminous curbing in one pass and eliminates the need of curbing forms is announced by E. D. Etnyre. The machine is self-propelled and utilizes exhaust from its own engine to preheat and blast-clean the surface on which the curbing is laid. It lays straight curbing or short-radius curves at speed ranges of 4 to 6 ft. of curb per minute. An exchangeable mold is sufficiently offset from the rest of the machine to lay curbing at the exact edge of the pavement or within one inch of any obstruction. Operated by two men, the new curb-paver is designed so that it cannot be jammed by overloading. It is 5 ft. 2 in. long x 23 in. wide and weighs 750 lbs. For more data write E. D. Etnyre and Co., Oregon, Ill., or circle **No. 8-11** on the reply card.

Unit lays 4 to 6 ft. of curb per min.

Self-Propelled Concrete Saw

The Target Model 360 self-propelled concrete saw is equipped with a 36 hp engine and has forward speeds of 1 to 25 feet per minute. With an accurate indicating dial in front of his eyes, the operator hydraulically adjusts the blade cutting depth with precision while the saw is in motion. The engine is specially equipped for protection against the dust and sludge of concrete sawing. For information write Robert G. Evans Co., 7204 Wyandott, Kansas City 14, Mo., or circle **No. 8-12** on the reply card.

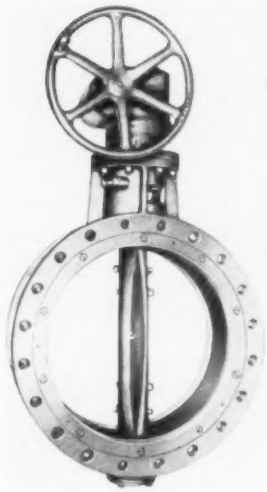
Rotary Mower For Highway Maintenance

A new safety design model rotary mower has been introduced by Sunflower Industries. This unit incorporates both strong construction and the safety features required for highway and public park mowing. It mows a 60-inch swath with cutting heights from ground to 14 inches. For use with any tractor it is available for 3-point hitch, fast hitch, or universal draw bar hitch. For full details write Sunflower Industries, Inc., Olathe, Kans., or circle **No. 8-13** on the reply card.

Rotary mowers for all tractor models

Front-Mounted Road Sweeper

A new front-mounted sweeper for use with any tractor or truck has been introduced by Little Giant Products. It is driven by an 8 hp, air-cooled, independent gasoline engine, with no power take-off. Speed of rotation of the brush is constant, controlled by governor settings, and is entirely independent of the speed of the prime mover. The sweeper assembly can be detached in a few minutes by removal of one kingpin and disconnecting hydraulic quick coupling. The brush has a simple adjustment for wear, angles 30 degrees right or left and tilts at either end. The height is 51 inches, diameter 31 inches, and brushes can be obtained in 6, 7 or 8-ft. lengths. For Full details write Little Giant Products, Inc., Peoria, Ill., or circle **No. 8-14** on the reply card.



Sewer and water plant valves

Leopold Introduces New Butterfly Valve

Rubber seated butterfly valves have been added by Leopold to its line of water purification and filter plant equipment. The valve seat is of resilient neoprene rubber or pure gum rubber, vulcanized around a continuous steel ring insert. There is no break in this steel ring, thus eliminating abnormal wearing. The disc is edge coated with stainless steel, monel or other specified alloy. The valves are made in sizes 6 to 72 inches of any desired metal, to conform to AWWA specifications and to meet a wide range of operating requirements. They are furnished with manual or automatic operators, with or without flanges. They are easy to operate, provide positive drop-tight shut-off and require a minimum of care. For further information write F. B. Leopold Co., Inc., 2313 W. Carson Street, Pittsburgh, Pa., or circle **No. 8-15** on the reply card.

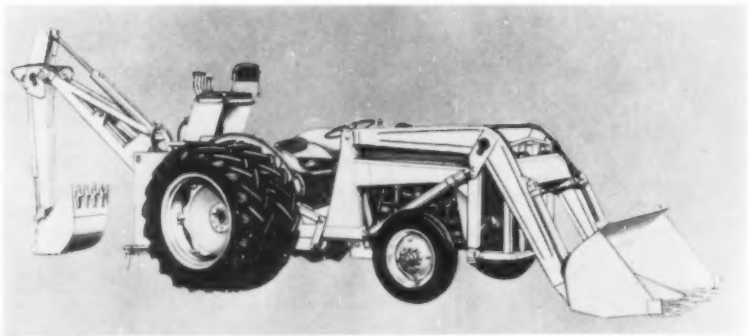
Power Drive Added To Johnson Lo-Bin Batcher

An optional power-drive arrangement with electric motor for all Lo-Bin (Trolley) batchers is announced by C. S. Johnson Co. The power unit can be fitted to any Lo-Bin batcher of 22 or 44 cu. ft. capacity or on combination cement and aggregate batchers. The Johnson Lo-Bin is a well known flexible and economical batcher that meets a wide range of requirements. It is designed with bin capacities of 8, 20 or 30 tons, arranged for 2, 3 or 4 aggregates. The 30-ton unit can be arranged to handle 3 aggregates and 1 cement. A 40-ton Lo-Bin also is available with 3 equal compartments for aggregate only. The unit is designed with an exceptionally low charging height—7½ or 9½ feet, depending on bin capacity. More information is available from C. S. Johnson Co., Champaign, Ill., or circle **No. 8-16** on the reply card.

Side Boom For Pipe Laying

Municipalities and public utilities will find a useful tool in the pipelayer attachment announced by Midwestern Manufacturing Co. for use with Caterpillar D2 Tractors. Known as the No. 2 Side Boom, the new attachment has a lifting capacity of 8400 pounds at 2-foot overhang. Easy operation of the heavy-duty boom and load winches is assured by the use of hydraulic controls. A 1200-pound counterweight helps provide needed stability, as does the long track frame of the special D2 Tractor arrangement used with the new pipelayer. The standard arrangement will have 12-inch grouser shoes. For further information write Midwestern Mfg. Co., Inc., Tulsa, Oklahoma, or circle **No. 8-17** on the reply card.

Pipelayer attachment for Caterpillar crawlers for laying water and sewer pipes



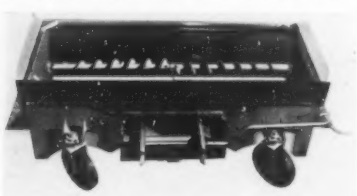
This loader and backhoe can be moved from job-to-job without road restrictions

Loader and Backhoe on Massey-Harris-Ferguson Tractor

The M-H-F Work Bull Model 202, with 9 cubic-foot loader and heavy-duty 185 backhoe, can dig, load, grade, clear and backfill. In transit, both attachments retract close to the machine, giving the operator clear vision for safe travel. There are no road restrictions when traveling between job sites. The backhoe is available with buckets in sizes from 12 to 36 inches. Backhoe reach is 14 ft. 8 in., digging depth 13 ft., dumping height 10 ft. 2 inches. For more information write Massey-Harris-Ferguson Inc., Quality Ave., Racine, Wisc., or circle **No. 18-18** on the reply card.

New Aggregate Spreader

A new aggregate spreader announced by Highway Equipment has many sound engineering features. An important one is the swivel wheel arrangement on the front of the spreader which prevents the unit from tipping forward or backward when unhooked from the truck. A large diameter feed roller with deeply cut right and left spirals to grip material makes it possible to spread from fine sand to 2-inch diameter crushed rock. The spreader hitch allows quick hook-up to all type trucks and a transmission, fully enclosed, automatically shifts into forward gear when going ahead and into reverse when backing up. For further information write to Highway Equipment Company, Inc., 616 D Avenue Northwest, Cedar Rapids, Iowa, or circle **No. 8-19** on the card.



Unit will not tip forward or backward

Heavy Duty Jumbo Barricade Unit

The new Jumbo barricade unit, made by Interstate Rubber, consists of a 24-inch square Jumbo base and a 36-inch adapter sign, combined with the standard 28-inch barricade cone. The base slips over and interlocks with the cone to make an integrated unit. Two such base-cone units support the new 36-inch adapter sign creating a maximum barricade easily seen by motorists. A single base and cone can also be used with a 12-inch pilot adapter sign in windy areas. High stability factor of the 9-lb. base allows the unit to withstand wind velocities up to 60 mph. Interstate's trafficones are resilient rubber cone-shape with square base, available in 12, 18 and 28-inch heights and are used to

Construction work barricades

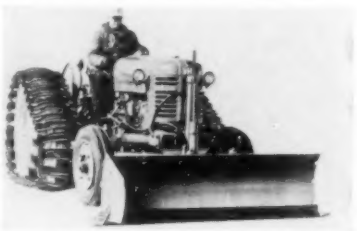
establish temporary lanes to guide, direct or control all types of vehicular traffic. Standard colors are provided that do not peel, chip or discolor, and remain permanently bright. For more information write Interstate Rubber Products Corp., Dept. R1, 908 Avila St., Los Angeles 12, Calif., or circle **No. 8-20** on the reply card.

Patch Concrete With Cement Bond

Cement Bond was developed by Tropical Paint to provide a successful means of patching or reconditioning broken or cracked concrete floors, steps and driveways. The surface is cleaned and dampened and Cement Bond brushed on and after a half hour, or overnight wait, the new mix is troweled in. Patches withstand heavy traffic. The new surfaces must be at least a half inch thick and not feathered. Complete information is available from Tropical Paint Co., Cleveland 2, Ohio, or circle **No. 8-21** on the reply card.

Arps Dozer For IHC-300 Tractor

A dozer for the IHC-300 utility tractor has been announced by Arps. The unit is called "Dual-Action" because of the double-acting hydraulic cylinder on the blade. In combination with the I-H Hydra-Touch control valve, this hydraulic cylinder will afford enough positive hydraulic down-pressure on the blade to afford penetration in hard and partially frozen soils. It can be used in removing topsoil and backfilling, grading, bulldozing, snow-plowing and shal-



Arps half-tracks add crawler traction and power to handle rough dozing work

low excavations. There are five angular adjustments for the blade so that it may serve either as a bulldozer or as an angledozer. In addition, there are three adjustments for the cutting pitch. The blade raises 18 inches off the ground and is furnished in a 6-ft. length. Further information from Arps Corporation, New Holstein, Wisconsin, or circle **No. 8-22** on the reply card.

Vertical, Hollow-Shaft General Electric Motors

A completely new line of vertical, hollow-shaft motors in 7½ through 30 hp has been announced by General Electric. Designed for water-pumping applications, they incorporate features of the new Tri-Clad horizontal motors and of the larger size vertical motors. An exterior feature of the new design is a quick-look gage near the top of the unit which permits easy checking of the oil level. Grease-lubricated bearings are used on the smaller size motors. The completely redesigned stator is prewelded and annealed to reduce elec-

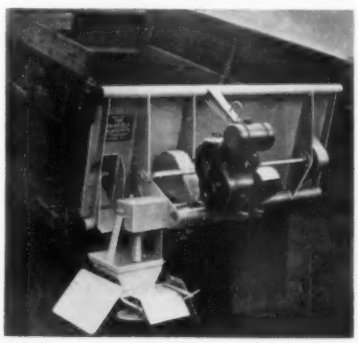
trical losses in the core. The insulation system has windings of Formex wire for greater protection against heat aging and full voltage starting stresses. A new polyester film is used in slot and phase insulation for improved dielectric strength. Aluminum windings and fan in the rotor are manufactured by a pressure casting technique. As a result, heat generated in the motor is substantially reduced and space within the motor frame is more fully utilized. Each rotor is dynamically balanced to assure best performance. Frame and end shields are of cast iron for protection against damage and to prevent the motor from being twisted out of alignment. The lightweight top can be quickly removed for access to all parts involved in installation of the motor on the pump head. For further details write General Electric, Schenectady, 5, N.Y., or circle **No. 8-23** on the reply card.

New Shawnee Backhoe Digs 14 Ft. Deep

The new "Chief" announced by Shawnee, digs effectively at the 14-foot level, but its actual reach below the ground surface is 15 feet. It obtains exceptional power by synchronizing the action of a push cylinder at one end of the bucket boom axis with another pull cylinder midway between the axis and the bucket. The company refers to this action as Push-Pull-Power. Utilizing the two synchronized cylinders relieves strain and increases digging pressure. By providing three 120 degree quadrants for operating, the operator may switch the boom to either of the quadrants without moving from his seat. Hydraulically controlled "feet" stabilizers quickly aline the tractor for plumb digging, as when working sideways on a hill or with one wheel on a curb. For full details write Shawnee Mfg. Co., Inc., 1947 North Topeka Ave., Topeka, Kansas, or circle **No. 8-24** on the reply card.

Highway Material Spreader

An improved material spreader that can be used for salt, sand and cinders has been announced by Fairfield Engineering. This new spreader will fit any standard 3-cu. yd. dump body tail gate, and can be installed very quickly. All controls for the material being spread are located in the truck cab and are operated by the driver, thereby eliminating the necessity of having an extra man on the back of the truck. Readily adjustable baffles are provided at the distributor disc to control the spread width. The unit will spread material



over two highway lanes and can also throw the material forward in order to obtain better traction. Further details by writing to the Fairfield Engineering Company, Marion, Ohio, or circle **No. 8-25** on the reply card.

G E Announces New General Purpose Floodlight

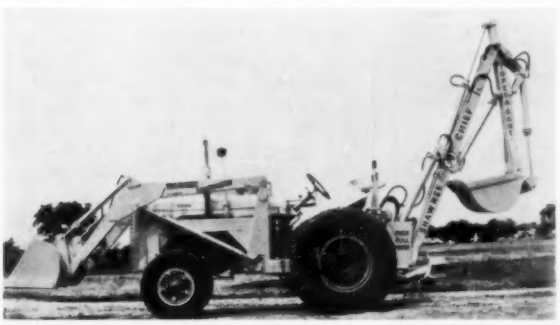
An improved model of the General Electric L-69 general purpose floodlight, designated the L-69A, is said to provide better performance and greater flexibility than its predecessor. It produces more light per unit, more beam lumens per watt, and higher uniform beam candlepower. The unit is suitable for a wide variety of sports and recreation, commercial, railroad and transportation, and industrial applications. One outstanding feature of the floodlight is a new faceted rear

Floodlight for many applications

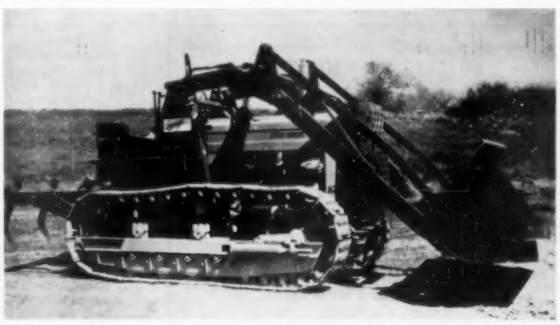
reflector which combines with the front reflector to provide high average beam candlepower and optimum beam distribution. Socket and housing assembly design permits free circulation of air, reducing temperatures within the housing and lessening the amount of heat conduction to the terminals. The design retains the spun-sealed feature which helps keep the interior clean and virtually eliminates glassware breakage. For more details write the General Electric Co., Schenectady 5, N. Y., or circle **No. 8-26** on the reply card.

Tractor Shovel on John Deere Tractor

The Henry TS-40F industrial tractor shovel has been tested and approved by John Deere for use on their 420 and 40 crawler tractors. Special features include a self-leveling bucket, double-acting lift cylinders, solid steel lift arms and full flow oil filter. Lifting capacity to full height is 3,000 pounds. The shovel will handle heavy duty leveling, loading and shoveling jobs with speed and economy. For additional information on this machine write to the Henry Manufacturing Co., 1700 North Clay, Topeka, Kansas, or circle **No. 8-27** on the reply card.



Backhoe can be removed from tractor in only a few minutes



Self-leveling bucket permits faster loading and leveling

CLASSIFIED ADVERTISING AND JOB OPPORTUNITIES

BOOKS IN BRIEF

1956 MUNICIPAL YEAR BOOK

The 23rd annual volume of the Municipal Year Book contains 24 major tables with much information on the organization, personnel, finances, and activities of cities in the United States. Highlights include special sections on municipal housing codes, central municipal garages, and city-owned transit systems. Other sections deal extensively with problems transcending the corporate limits of cities. One article contains detailed information on special district governments serving the larger metropolitan areas. Data are shown on organization, financing, legal bases and governmental services provided.

In addition to the new sections, most of the regular sections of former Year Books have been retained and brought up-to-date. These include data on form of government, salary of councilmen, pay rates for selected city jobs, salaries of municipal officials, number of city employees and payrolls, personnel organization, working conditions, retirement systems, financial statistics, parking lots, fire and police data, directories of city officials, bibliographies in various fields, and model municipal ordinances.

Clarence E. Ridley and Orin F. Nolting, editors. International City Managers' Association, 1313 East 60 Street, Chicago 37, Ill. June, 1956. 582 pp. $10 postpaid.

DESIGN OF STORM-WATER INLETS

This book "The Design of Storm-Water Inlets" is devoted exclusively to the problem of inlet design. Findings that are presented are based on model tests of many types of inlets. Included in its 193 pages is information on: curb, gutter, deflector, combination, sump and multiple inlets in depressed and undepressed settings, and on various crown slopes and gutter grades. Also included are: inlet rating curves and tables, nomographs and charts of gutter flow parameters, empirical equations and illustrated examples of their use, findings and recom-

mendations. The text is available from Paul Bock, Project Engineer, Department of Sanitary Engineering and Water Resources, The Johns Hopkins University, Baltimore 18, Maryland. Cost per copy is $5.

BRITISH PRACTICE IN SEWAGE DISPOSAL

The third edition of a work, first published in 1927 differs from the second, appearing in 1939, in having a chapter concerning trade wastes and in discussing land treatment in the chapter on methods applicable to rural areas. A history of sewage treatment and disposal in Great Britain comprises Chapter 1. The book purposely omits details such as discussions of hydraulic principles. In other respects the book is a conventional text, but distinctly British in connotation, terminology, and application. The title is "The Disposal of Sewage"; the author, T. H. P. Veal, Lecturer in Civil Engineering, University of Birmingham. The book has 208 pages, clothbound, and is sold by Chapman and Hall, Ltd., 37 Essex St., W.C. 2, London at a price of 30 shillings.

MOSQUITO ABATEMENT

This, the first operational report of the South Cook County Mosquito Abatement District, was prepared by W. J. Buchanan, Engineer-Manager of the District. The report outlines the District's program, its primary objectives and accomplishments during 1955. Included are summaries of the findings of surveys and inspections, measurements of mosquito populations and field anti-mosquito work as well as statements of the District's physical assets and financial aspects of operations. Report available from The South Cook County Mosquito Abatement District, 308 West 147th St. (P.O. Box 338), Posen, Illinois.

PLANT LOCATION IN THEORY AND IN PRACTICE

This 338-page book on the theory of industrial plant location is divided into four parts. Part 1 examines the cost theory and the market area-locational interdependence approach and the author combines them into a single system. Part 2 breaks the integrated theory down into its several components and examines the influence on plant location of transportation, processing costs, demand, and the cost-reducing and revenue-increasing factors. Plant location in theory and in practice includes, in Part 3, a study of small firms. Finally, in Part 4, the author evaluates the basic postulate of past and present-day location theory, determines the modifications which practice requires of location theory, and offers a general theory of plant location. The author is Melvin L. Greenhut, an associate professor in the Dept. of Economics and Business administration, Rollins College, Winter Park, Fla. Publishers are The University of North Carolina Press, Chapel Hill, N. C. Price is $7.50.

NEWS OF ENGINEERS

COL. MICHAEL J. BLEW, AUS, has resigned as chief of the Water and Sewage Section, R & U Division, Corps of Engineers, and will become associated with the National Society of Professional Engineers as a member of the Washington staff. Col. Blew has been with R & U since his relief from active duty in 1946.

EDMUND F. HUGHES has become General Superintendent of the Sewerage & Water Board of New Orleans, La., succeeding the late A. Baldwin Wood.

N. M. NEWMARK has been made Head of the Civil Engineering Department of the University of Illinois, succeeding Prof. W. C. Huntingdon who served for 36 years.

J. L. ROBERTSON, "Robbie" to most folks, has retired from the Public Health Service after 31 years of service, but will continue to serve as a special consultant.

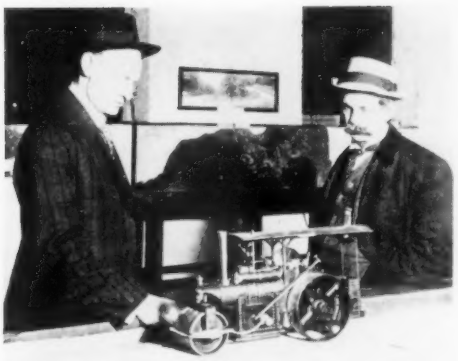
NOEL S. CHAMBERLIN has joined the staff of Havens & Emerson, Consulting Engineers of New York and Cleveland. Mr. Chamberlin was, for a number of years, with Wallace & Tiernan's Division of Technical Services.

BURLEIGH R. DOWNEY, Maintenance Engineer of the Michigan State Highway Department, has retired after many years of service. After a trip abroad, he will remain active as a part-time engineering consultant.

SCANLON-McMAHON Associates, Inc., is a new firm of consulting engineers. The principals are Thomas R. Scanlon and James F. McMahon, Jr. Offices have been opened at 18725 Scottsdale Blvd., Shaker Heights 22, Ohio. The firm will specialize in industrial process and power plant equipment.

INDEX OF ADVERTISEMENTS

Versatile Bob Shea, manager of Public Works' Chicago advertising office, adds a new accomplishment—driving a Caterpillar D-9 tractor at the recent demonstration marking the opening of Cat's new Decatur, Illinois, plant. Quite apparently "it's nice work if you can get it."



In contrast to the modern machines elsewhere on this page is this model of a steam roller in the days of the 5¢ fare and beer strainer moustache. Photo, made at the first ARBA Road Show in 1909, is published as a reminder of the colossal Road Show coming next January.

—Worth Seeing

Here's another "versatile," the Malsbary 250 steam cleaner, as used by the City of Bozeman, Montana, for thawing frozen storm water inlets. Bozeman's City Manager, M. E. Henderson, reports, "The large and continuous flow of steam at high pressure works excellently to accomplish this purpose . . . under the most severe winter conditions."

"Pike's Peak or bust" takes rugged equipment now as in the pioneer days. Here is shown an International TD-24 equipped with hydraulic bulldozer sent out by the City of Colorado Springs to keep Pike's Peak Toll Road open.

This picture shows the tractive power of the Seaman-Gunnison "Duo-Pactor." By towing a pull-type pneumatic tired roller, practically completed compaction is obtained in a single pass on this airport resurfacing job at Mitchell Field, Milwaukee, Wisconsin.

WORTH TELLING

by Arthur K. Akers

★ AT DORR-OLIVER Inc., Stamford, Conn., A. L. Morris again moves up, to the new post of director of company relations, in charge of all public relations and personnel functions. The sales department has been reorganized under T. Bartow Ford, vice president —sales. Sanitary sales have been divided into five geographical divisions with two new ones added, in Atlanta and Dallas.

★ MORTIMER B. FULLER, Jr., treasurer, International Salt Co., Scranton, Pa., adds a vice presidency to his responsibilities.

★ LeTOURNEAU - WESTINGHOUSE CO. appoints Jack G. Errion as assistant to the domestic sales manager. Kenneth W. Chriswell becomes assistant advertising manager.

★ A $3,000 fellowship honoring Herbert Spencer, a founder and former president of the Asphalt Institute, has been established at Cornell University by the Esso Standard Oil Co. This is the first step in the Institute's expanded educational program.

★ LOUIS F. FONTANA, sales manager, Irving Subway Grating Co., has been elected president of The National Association of Architectural Metal Manufacturers.

★ CATERPILLAR TRACTOR CO. selects Aurora, Ill., as site for its new plant to build D2 and D4 crawler tractors. Decatur and Joliet plants will be expanded.

★ DON FRICKER, former advertising manager the Heil Company, has joined the Western Advertising Agency of Racine and Chicago.

★ IRVIN L. GEBHARD becomes general manager of the Koehring Company of California. He will maintain contact with all Koehring products distributors, as well as those of three Koehring subsidiaries, in the Northwest. Parsons Company and Kwik-Mix Company are among the latter.

★ JOHN C. FINN is newly-named assistant to Carl N. Brown, sales manager—pipe, of the United States Pipe and Foundry Co., Birmingham. Whitney K. Stearns replaces Mr. Finn as New England sales agent.

★ W. E. GALLAND is advanced by Western Machinery Co., San Francisco, to management of their Solids Pump Division.

★ THE NEW Massey-Harris-Ferguson line of light and medium tractors and allied equipment will utilize, it is announced, the loaders, back-hoes, and Work- and Pit-bulls of Charles J. Davis, president of Mid-Western Industries.

★ M. B. SKINNER, South Bend, Ind., announces a new building to increase present floor space by more than 30 percent. K. G. Merrill, president of Skinner, is not only a manufacturer and musician but no mean advertising expert as well. We salute him in all three categories!

★ DWIGHT T. MYERS is named president of Veon Chemical Corporation, makers of "Perma-Line" traffic paint. He was formerly deputy commissioner and chief engineer of the New York City Department of Traffic.

★ NATURAL RUBBER BUREAU, Washington, appoints J. York Welborn as director of its research laboratory across the Potomac, in Virginia.

★ FAIRCHILD AERIAL SURVEYS Inc., Los Angeles, has acquired Gray-McKinnon Surveys Inc., of Tallahassee, Fla. Larger quarters and additional equipment come next, all reflecting the rapid growth of the usefulness of aerial surveying.

★ JACKIE GLEASON'S elderly aunt was persuaded to try her first Martini. "Why," she said with a wry face, "this tastes just like the medicine poor Jackie has been taking for the past twenty years!"

—N. D. Coarse Screenings

HORTON WATERSPHEROID

CHOSEN FOR ITS

Beauty and Ability to Supply Gravity Pressure Storage

City Council members of Sandwich, Illinois took these reasons into consideration when choosing a Horton Waterspheroid® for their city. At that time, the city was in dire need of ample water storage facilities and dependable, adequate water pressure.

The Horton Waterspheroid provides them with 300,000 gals. of elevated storage —a dependable gravity pressure water supply ready to meet normal and emergency water needs day or night— in a modern, pleasing structure.

Write Chicago Bridge & Iron Company for further information on the Horton Waterspheroid—or on other Horton elevated tanks.

CBI

Chicago Bridge & Iron Company

Atlanta • Birmingham • Boston • Chicago • Cleveland • Detroit • Houston
Los Angeles • New York • Philadelphia • Pittsburgh • Salt Lake City
San Francisco • Seattle • Tulsa

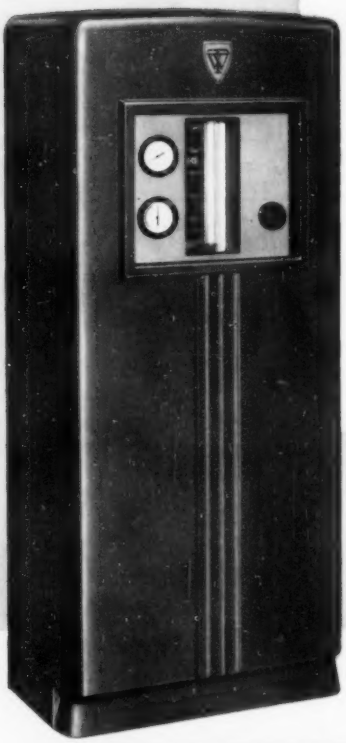
Plants in BIRMINGHAM, CHICAGO, SALT LAKE CITY and GREENVILLE, PA.

WALLACE & TIERNAN

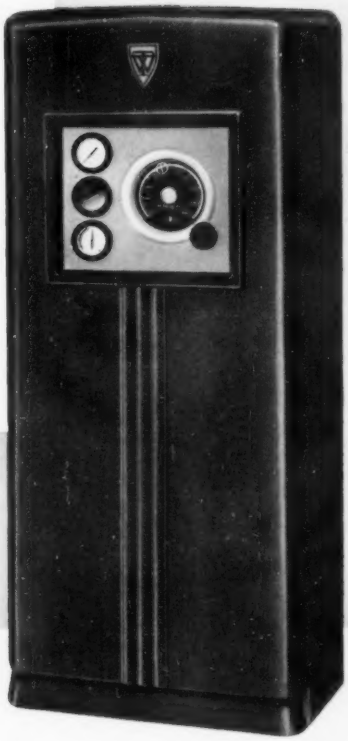
V-NOTCH

variable-orifice

CHLORINATORS



A-711 V-notch Chlorinator has rotameter indicator with 10 to 1 feed range



A-712 V-notch Chlorinator has dial indicator with 20 to 1 feed range

NEW *V-notch Chlorinators* SIMPLIFY *Chlorination*

With the new Wallace & Tiernan V-notch Variable-Orifice Chlorinators:

OPERATION IS SIMPLIFIED as one injector control starts or stops the unit. Chlorine gas is turned on or off automatically.

SETTING FEED RATE IS SIMPLIFIED as one control sets feed rate precisely at both high or low feeds.

INSTALLATION IS SIMPLIFIED as units are shipped ready for operation. No water supply is needed at the chlorinator. A remote injector uses only standard water supply fittings.

MAINTENANCE IS SIMPLIFIED and virtually eliminated. All parts are corrosion resistant, mounted in an attractive modern cabinet.

For full details on manual or automatic proportional V-notch Chlorinators, contact your W&T representative, or write to the address below.

A New Development from Wallace & Tiernan Research

WALLACE & TIERNAN INCORPORATED

25 MAIN STREET, BELLEVILLE 9, NEW JERSEY

S-110